

California High-Speed Rail Program



RFP No.: HSR 13-57

Request for Proposal for Design-Build Services for Construction Package 2-3

Book III, Part B – Directive Drawings

California High-Speed Rail Authority



RFP No.: HSR 13-57

**Request for Proposals for Design-Build
Services for Construction Package 2-3**

**Book II, Part B.1
Directive Drawings**

General

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CIVIL DIRECTIVE NOTES

A. GENERAL SITE NOTES

- 1. FIELD VERIFY ALL EXISTING SITE CONDITIONS PRIOR TO THE COMMENCEMENT OF WORK AND REPORT ANY DISCREPANCIES TO THE AUTHORITY’S REPRESENTATIVE.
- 2. ALL CONSTRUCTION ACTIVITIES AFFECTING THIRD PARTY FACILITIES SHALL BE COORDINATED WITH THE PROPER JURISDICTION AUTHORITY.
- 3. FOR ABBREVIATIONS, SEE GENERAL DIRECTIVE DRAWINGS.
- 4. FOR SYMBOLS, SEE GENERAL DIRECTIVE DRAWINGS.
- 5. "ORIGINAL GROUND" SHOWN ON CROSS SECTIONS REFERS TO THE APPROXIMATE EXISTING GROUND LINE AT THE DESIGNATED CENTERLINE, BASELINE, LAYOUT LINE OR SECTION LINE.
- 6. ALL WORK SHALL CONFORM TO ALL LOCAL, STATE AND FEDERAL CODES AND ORDINANCES IN EFFECT.
- 7. PROVIDE AND MAINTAIN PROPER BARRICADES, RAILINGS, GUARDS, FLAGGING, LIGHTING, OR OTHER DEVICES NECESSARY FOR THE PROTECTION OF LIFE AND PROPERTY.
- 8. VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING MATERIALS.

B. GRADING

- 1. DO NOT PERFORM ANY GRADING OPERATION SO AS TO CAUSE FALLING ROCKS, SOIL OR DEBRIS IN ANY FORM TO FALL, SLIDE OR FLOW ONTO ADJOINING PROPERTIES, STREETS OR NATURAL WATERCOURSES. SHOULD SUCH VIOLATION OCCUR THE CONTRACTOR MAY BE CITED AND THE CONTRACTOR SHALL IMMEDIATELY MAKE ALL REMEDIAL ACTIONS NECESSARY.
- 2. KEEP THE PROJECT AREA AND SURROUNDING AREA FREE FROM DUST NUISANCE.
- 3. PROVISIONS SHALL BE MADE TO PREVENT SURFACE WATERS FROM DAMAGING THE CUT FACE OF AN EXCAVATION OR THE SLOPED SURFACES OF A FILL. FURTHERMORE, PROVISIONS SHALL BE MADE TO PREVENT SEDIMENT-LADEN RUNOFF FROM LEAVING THE SITE.
- 4. THE LIMITS OF THE AREA TO BE GRADED SHALL BE FLAGGED BEFORE THE COMMENCEMENT OF THE GRADING WORK.
- 5. ALL GRADING OPERATIONS SHALL BE PERFORMED IN CONFORMANCE WITH THE APPLICABLE PROVISIONS OF THE WATER POLLUTION CONTROL AND WATER QUALITY STANDARDS CONTAINED IN THE LATEST CALTRANS STORM WATER QUALITY HANDBOOKS.

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| DESIGNED BY | S. MILITELLO |
| DRAWN BY | R. MINCIO |
| CHECKED BY | H. NGUYEN |
| IN CHARGE | J. CHIRCO |
| DATE | 01/24/2014 |



CALIFORNIA HIGH-SPEED TRAIN PROJECT
GENERAL DIRECTIVE

GENERAL DIRECTIVE NOTES
CIVIL

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| CONTRACT NO. |
| DRAWING NO. DD-GE-001 |
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TRACK DIRECTIVE NOTES

- 1. THE GENERAL BASIS FOR TRACK STANDARDS AND MATERIALS SHALL BE THE AREMA MANUAL.
- 2. TRACK AND TRACK COMPONENTS SHALL BE DESIGNED AND FABRICATED TO PERFORM UNDER THE PREVAILING AND EXTREME CLIMATIC AND ENVIRONMENTAL CONDITIONS OCCURRING WITHIN THE GEOGRAPHIC EXTENT OF THE SYSTEM.
- 3. THE PROFILE GRADE LINE IS CARRIED ON THE TOP OF LOW RAIL THROUGH HORIZONTAL CURVES AND SPIRALS FOR THE DESIGNATED TRACK.
- 4. THE LENGTHS OF TRACK IS BASED ON CENTER OF TRACK ALIGNMENT.
- 5. UNLESS SEPARATE TRACK PROFILES ARE GIVEN, TRACK PARALLEL TO THE DESIGNATED TRACK ARE AT THE SAME TOP OF RAIL ELEVATIONS PROJECTED ON EITHER PERPENDICULAR OR RADIAL LINES FROM THE DESIGNATED TRACK CENTERLINES.
- 6. BALLASTED TRACKS ARE GENERALLY PREFERRED FOR YARD TRACKS. DESIGNERS SHALL FOLLOW THE REQUIREMENTS ASSOCIATED WITH CONSTRUCTION OF BALLASTED TRACK IN THE CALIFORNIA HIGH SPEED TRAIN DESIGN MANUAL.

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| DRAWN BY | R. MINCIO |
| CHECKED BY | H. NGUYEN |
| IN CHARGE | J. CHIRCO |
| DATE | 01/24/2014 |



CALIFORNIA HIGH-SPEED TRAIN PROJECT
GENERAL DIRECTIVE

GENERAL DIRECTIVE NOTES
TRACK

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STRUCTURAL DIRECTIVE NOTES:

A. SPECIFICATIONS FOR DESIGN AND CONSTRUCTION

- 1. CONSTRUCTION SPECIFICATION SHALL BE THE DESIGN-BUILD STANDARD SPECIFICATION, CALIFORNIA HIGH SPEED TRAIN.
- 2. THE STRUCTURAL DESIGN OF STRUCTURES SUPPORTING HIGH SPEED TRAINS SHALL BE BASED ON THE REQUIREMENTS OF THE CALIFORNIA HIGH SPEED RAIL AUTHORITY.
- 3. DESIGN CRITERIA FOR HIGHWAY BRIDGES SHALL BE THE CALIFORNIA BRIDGE DESIGN SPECIFICATION. FOR HIGHWAY BRIDGES PASSING OVER THE HIGH SPEED TRAIN THE BRIDGE DESIGN SPECIFICATION SHALL BE SUPPLEMENTED BY THE CALIFORNIA HIGH SPEED TRAIN REQUIREMENTS FOR SEISMIC DESIGN.
- 4. DESIGN CRITERIA FOR RAILROAD STRUCTURES NOT SUPPORTING HIGH SPEED TRAINS SHALL BE THE AMERICAN RAILWAY ENGINEERING AND MAINTENANCE-OF-WAY ASSOCIATION (AREMA) MANUAL FOR RAILWAY ENGINEERING (APRIL 2008). FOR RAILROAD BRIDGES PASSING OVER THE HIGH SPEED TRAIN THE BRIDGE DESIGN SPECIFICATION SHALL BE SUPPLEMENTED BY THE CALIFORNIA HIGH SPEED TRAIN REQUIREMENTS FOR SEISMIC DESIGN.

B. DESIGN METHOD

- 1. DESIGN SHALL BE PERFORMED TO THE LOAD AND RESISTANCE FACTOR (LRFD) DESIGN METHOD.
- 2. THE DESIGN OF PRESTRESSING AND PARTIAL PRESTRESSING SHALL CONFORM TO THE REQUIREMENTS OF SUBSECTION 5.9 OF AASHTO LRFD WITH CALIFORNIA AMENDMENTS WITH THE FOLLOWING EXCEPTION: NET TENSION STRESSES ARE NOT ALLOWED IN THE PRECOMPRESSED TENSILE ZONE AFTER ALL LOSSES HAVE OCCURRED.

C. GENERAL

- 1. SEE GENERAL DIRECTIVE DRAWINGS FOR ACRONYMS AND ABBREVIATIONS.
- 2. ALL STRUCTURAL DRAWINGS SHALL BE READ IN CONJUNCTION WITH THE SPECIFICATIONS AND ALL OTHER DRAWINGS RELATED TO THE WORK.
- 3. EMBEDDED ITEMS SUCH AS PIPES, INSERTS, SLEEVES AND CONDUITS, AND ANY RECESSES, NICHES OR OPENINGS REQUIRED FOR UTILITY, ARCHITECTURAL, MECHANICAL AND ELECTRICAL INSTALLATIONS ARE NOT SHOWN ON THE STRUCTURAL DRAWINGS. CONTRACTOR SHALL REFER TO THE UTILITY, ARCHITECTURAL, MECHANICAL AND ELECTRICAL DRAWINGS FOR THE LOCATIONS AND DETAILS OF THESE ITEMS. CONTRACTOR SHALL REVIEW AND APPROVE ALL PENETRATIONS PRIOR TO CONSTRUCTION. PENETRATIONS WHICH LOCAL THICKENING OF CONCRETE OR STEEL MEMBERS AND /OR SUPPLEMENTAL REINFORCING SHALL BE SHOWN ON THE STRUCTURAL DRAWINGS.
- 4. THE VERTICAL CONTROL OF ALL TRACK STRUCTURES IS BASED ON THE TOP OF LOW RAIL ELEVATION IN SUPERELEVATED STRUCTURES.

- 5. CONTRACTORS ATTENTION IS DIRECTED TO THE AREAS OF SAG VERTICAL CURVES. IN SUCH AREAS CAUTION SHOULD BE EXERCISED THAT THE DIMENSION TO THE INVERT OF CONCRETE OF GUIDEWAY IS NEVER LESS THAN THAT SHOWN FOR INVERT DETAILS.
- 6. ALL CONSTRUCTION JOINTS IN EARTH RETAINING STRUCTURES AND IN STRUCTURES BELOW THE FINISH GRADE SHALL CONTAIN CONTINUOUS WATERSTOPS, AND SHALL HAVE REINFORCEMENT CONTINUOUS ACROSS ALL JOINTS. HYDROSWELLING STRIPS SHALL BE INSTALLED ON ALL JOINT SURFACES WHICH WILL BE EXPOSED TO EARTH AND PERMANENTLY UNDER THE GROUNDWATER ELEVATION.
- 7. ALL WATERSTOPS SHALL BE INSTALLED SECURELY IN ACCORDANCE WITH THE SPECIFICATIONS. THE WATERSTOPS SHALL BE PLACED CONTINUOUSLY THROUGHOUT THE LENGTH OF THE CONSTRUCTION JOINT. LAPPING OF WATERSTOPS SHALL NOT BE PERMITTED. SPLICING SHALL BE IN ACCORDANCE WITH THE SPECIFICATIONS.
- 8. UNLESS INDICATED OTHERWISE, CONCRETE SURFACES LEADING TO DRAINS SHALL BE SLOPED A MINIMUM OF 1/8 INCH PER FOOT TOWARD THE DRAIN AND THE ADJACENT SURFACES WARPED AS REQUIRED TO SATISFY AN ADEQUATE DRAINAGE FLOW.

D. MATERIAL PROPERTIES

- 1. CONCRETE 28 DAY COMPRESSIVE STRENGTH (MINIMUM)
 - a) DRILLED SHAFTS: f'c=4,000 PSI
 - b) PRECAST-PRESTRESSED PILES: f'c=6,000 PSI
 - c) FORMED CAST-IN-PLACE STRUCTURAL CONCRETE:
 - f'c (UNDER GROUND)=4000 PSI
 - f'c (ABOVE GROUND)=5000 PSI
 - d) PRECAST GIRDERS OR SEGMENTS OF GIRDERS: f'c=6,000 PSI
 - e) UNLESS NOTED OTHERWISE ON THE DRAWINGS, OR SPECIFIED, MINIMUM STRUCTURAL CONCRETE SHALL HAVE A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 4,000 PSI.
 - f) ALL EXPOSED CONCRETE EDGES AND CORNERS SHALL BE CHAMFERED WITH A 3/4 INCH, 45 DEGREE CHAMFER UNLESS NOTED OTHERWISE.
- 2. REINFORCING STEEL SHALL CONFORM TO THE SPECIFICATIONS OF ASTM A 706 GRADE 60.
- 3. PRESTRESSING STEEL
 - a) STRAND: ASTM A416/AASHTO M203, GRADE 270, LOW RELAXATION FRICTION COEFFICIENT: 0.25 WOBBLE COEFFICIENT: 0.0002 PER FT ANCHOR SET: 0.375" APPARENT MODULUS: 28,500 KSI MINIMUM JACKING STRESS: 216 KSI (80% ULTIMATE) MAXIMUM ANCHORING STRESS: 189 KSI (70% ULTIMATE) MAXIMUM STRESS AFTER ANCHOR SET: 202 KSI (75% ULTIMATE) STRAND DIAMETER: 0.6" (AREA=0.216 SQ IN)

- b) POST TENSIONING BARS: ASTM A722/AASHTO M275, GRADE 150, TYPE II ANCHOR SET: 0.0625" APPARENT MODULUS: 30,000 KSI MAXIMUM JACKING STRESS: 113 KSI MAXIMUM ANCHORING STRESS: 105 KSI MAXIMUM STRESS AFTER LOSSES: 96 KSI

- 4. STRUCTURAL STEEL SHAPES SHALL CONFORM TO ASTM A6 WITH A YIELD STRENGTH OF FY = 50 KSI UNLESS NOTED OTHERWISE. THE FOLLOWING MATERIAL PROPERTIES SHALL APPLY:

- a) WIDE FLANGE SHAPES: ASTM A992
- b) M-SHAPES, S-SHAPES, HP SHAPES: ASTM A572
- c) ANGLES, CHANNELS: ASTM A572
- d) RECTANGULAR AND SQUARE HSS: ASTM A500 GR B (46 KSI)
- e) ROUND HSS: ASTM A500 GR B (42 KSI)
- f) STEEL PIPE: ASTM A53 GR B (35 KSI)
- g) PLATES, BARS: ASTM A36 (36 KSI)
- h) BOLTS: ASTM A325
- i) NUTS: ASTM A563
- j) WASHERS: ASTM F436

5. STEEL FABRICATIONS

- a) WELDING OF BUILT UP MEMBERS AND STEEL FABRICATIONS SHALL COMPLY WITH AASHTO/AWS D 1.5
- b) WELDING OF HSS SECTIONS AND PIPES SHALL COMPLY WITH AWS D 1.1
- c) MISCELLANEOUS STEEL ITEMS SHALL BE HOT-DIP GALVANIZED AFTER FABRICATION UNLESS COMPLETELY EMBEDDED IN CONCRETE AND UNLESS NOTED OTHERWISE.

6. FASTENERS

- a) ALL HIGH STRENGTH BOLTS NUTS AND WASHERS SHALL BE ZINC COATED
- b) ALL BOLTED CONNECTIONS SHALL COMPLY WITH RESEARCH COUNCIL ON STRUCTURAL CONNECTIONS (RCSC) "SPECIFICATION FOR STRUCTURAL JOINTS USING ASTM A325 OR A490 BOLTS".
- c) ALL BOLTS ARE ASTM A325 HIGH STRENGTH SLIP CRITICAL WITH THREADS EXCLUDED FROM THE SHEAR PLANE

E. CONCRETE COVER

- 1. UNLESS OTHERWISE NOTED, MINIMUM CONCRETE COVER SHALL CONFORM TO AASHTO LRFD WITH CALTRANS AMENDMENTS TABLE 5.12.3-1 WITH THE FOLLOWING EXCEPTIONS:
 - a) UNCASD DRILLED SHAFTS: 6 INCHES
 - b) CASD DRILLED SHAFTS WITH TEMPORARY CASING: 4 INCHES

F. SEISMIC LOADING AND DESIGN

- 1. THERE ARE TWO LEVELS OF DESIGN EARTHQUAKES:
 - a) MAXIMUM CONSIDERED EARTHQUAKE (MCE): GROUND MOTIONS CORRESPONDING TO GREATER OF (1) A PROBABILISTIC SPECTRUM BASED UPON A 10% PROBABILITY OF EXCEEDANCE IN 100 YEARS (i.e., A RETURN PERIOD OF 950 YEARS) AND (2) A DETERMINISTIC SPECTRUM BASED UPON THE LARGEST MEDIAN RESPONSE RESULTING FROM THE MAXIMUM RUPTURE (CORRESPONDING TO Mmax) OF ANY FAULT IN THE VICINITY OF THE STRUCTURE.
 - b) OPERATING BASIS EARTHQUAKE (OBE): GROUND MOTIONS CORRESPONDING TO A PROBABILISTIC SPECTRUM BASED UPON AN 86% PROBABILITY OF EXCEEDANCE IN 100 YEARS (i.e., A RETURN PERIOD OF 50 YEARS).

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| DESIGNED BY P. LIN |
| DRAWN BY R. MINCIO |
| CHECKED BY T. JACKSON |
| IN CHARGE J. CHIRCO |
| DATE 08/29/2014 |



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| CALIFORNIA HIGH-SPEED TRAIN PROJECT GENERAL DIRECTIVE |
| GENERAL DIRECTIVE NOTES STRUCTURAL |

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| A | | B CONTINUED | | C CONTINUED | | D | |
|--------|--|-------------|---|-------------|---|-------|---------------------------------------|
| @ | AT | BCR | BEGIN CURB RETURN | CEM | CEMENT | D | DEPTH |
| A&E | ARCHITECTURAL AND ENGINEERING | BD | BOARD | CER | COMMUNICATIONS EQUIPMENT ROOM | DB | DESIGN-BUILD |
| A/G | AT-GRADE | BDA | BI-DIRECTIONAL AMPLIFIER | C&G | CURB & GUTTER | DBE | DESIGN BASIS EARTHQUAKE |
| AADT | AVERAGE ANNUAL DAILY TRAFFIC | BDD | BRIDGE DESIGN DETAILS (CALTRANS) | CG | CENTER OF GRAVITY | DBL | DOUBLE |
| AB | AGGREGATE BASE, ANCHOR BOLT | BDP | BRIDGE DESIGN PRACTICE (CALTRANS) | CGS | CALIFORNIA GEOLOGICAL SURVEY | DC | DIRECT CURRENT |
| ABBC | ASBESTOS BONDED BITUMINOUS COATED | BDS | BRIDGE DESIGN SPECIFICATIONS (CALTRANS) | CHNL | CHANNEL | DCMB | Dc DISTRIBUTION PANEL MAIN BREAKER |
| ABM | AIR-BLOWN MORTAR | BEC | BURIED EARTH (GROUND) CONDUCTOR | CI | CAST IRON | DCP | Dc DISTRIBUTION PANEL |
| ABN | ABANDON | BEG | BEGIN | CIC | COMMUNICATIONS INTERFACE CABINET | DD | DOWNDRAIN, |
| ABUT | ABUTMENT | BFA | BY PASS FEEDER ANCHOR | CIDH | CAST-IN-DRILLED-HOLE | DE | DEVICE DRIVER |
| ABV | ABOVE | BIL | BASIC IMPULSE INSULATION LEVEL | CIF | COMMON INTERMEDIATE FORMAT | DEL | DEAD END |
| AC | ALTERNATING CURRENT, ASPHALT CONCRETE | BITUM | BITUMINOUS | CIP | CAST IRON PIPE | DEMO | DELINEATOR |
| ACB | ASPHALT CONCRETE BASE | BK | BACK | C-I-P | CAST-IN-PLACE | DEPT | DEMOLISH |
| ACMB | AC DISTRIBUTION PANEL MAIN BREAKER | BKF | BACKFILL | CIPCP | CAST-IN-PLACE CONCRETE PIPE | DET | DEPARTMENT |
| ACOUS | ACOUSTICAL | BKR | BREAKER | CIS | CUSTOMER INFORMATION SIGN | DF | DETOUR |
| ACP | ASBESTOS CEMENT PIPE | BL | BASE LINE | CISS | CAST-IN-STEEL-SHELL | DGA | DIRECT FIXATION, |
| ACS | ACCESS CONTROL ROOM | BLDG | BUILDING | CJ | CONSTRUCTION JOINT | DHV | DRINKING FOUNTAIN |
| ACSR | ALUMINUM CONDUCTOR STEEL REINFORCED | BLKG | BLOCKING | CJP | COMPLETE JOINT PENETRATION | DI | DOWN GUY ANCHOR |
| AD | AREA DRAIN, ACCESS DETERRING | BLM | BRIDGE-LOG MILE | CKT | CIRCUIT | DIAG | DESIGN HOURLY VOLUME |
| ADJ | ADJACENT, ADJUST, | BLST | BALLAST | CL | CLASS | DIAPH | DRAINAGE INLET |
| ADJ | ADJUSTABLE | BLVD | BOULEVARD | CL2 | CLASS 2 | DIFF | DIAGONAL |
| ADL | ADDED DEAD LOAD | BM | BENCH MARK | CL-6 | CHAIN LINK FENCE (6 FT) | DIM | DIAPHRAGM |
| ADP | AC DISTRIBUTION PANEL | BN | BACKBONE NETWORK | CLG | CEILING | DIN | DIFFERENTIAL |
| ADT | AVERAGE DAILY TRAFFIC | BND | BOUND | CLK | CHAIN LINK | DIR | DIMENSION |
| AEC | AERIAL EARTH (GROUND) CONDUCTOR | BOC | BOTTOM OF CURB | CLKG | CAULKING | DISC | DROP INLET |
| AED | AUTOMATED EXTERNAL DEFIBRILLATOR | BOCC | BACK-UP OPERATIONAL CONTROL CENTER | CLO | CLOSET | DISP | DIRECTION |
| AFC | AUTOMATIC FARE COLLECTION | BOS | BOTTOM OF SLOPE | CLR | CLEAR, | DISTR | DISCONNECT |
| AFES | ALTERNATIVE FLARED END SECTION | BOT | BOTTOM | CM | CLEARANCE | DMBB | DISPENSER |
| AGW | AERIAL GROUND WIRE | BOW | BOTTOM OF WALL | CM | CONTROL MODULE, | DN | DISTANCE |
| AHD | AHEAD | BR | BRIDGE | CMP | CORRUGATED METAL | DNS | DISTRIBUTION |
| AL | ALUMINUM | BRG | BEARING | CMU | CORRUGATED METAL PIPE | DO | DOUBLE METAL BEAM BARRIER |
| ALIGN | ALIGNMENT | BRKT | BRACKET | CNTR | CONCRETE MASONRY UNIT | DPDT | DOWN |
| ALT | ALTERNATE | BRS | BROADBAND RADIO SYSTEM | CO | COUNTER | DR | DOMAIN NAME SYSTEM |
| AM | TIME FROM MIDNIGHT TO NOON | BRT | BUS RAPID TRANSIT | COL | CLEANOUT, | DS | DOOR OPENING |
| ANC | ANCHOR | BS | BODY SPAN WIRE | COMM | COUNTY | DS | DOUBLE-POLE DOUBLE-THROW |
| ANI | AUTOMATIC NUMBER IDENTIFICATION | BSC | BASE STATION CONTROLLER | CONC | COLUMN | DSC | DRIVE |
| ANN | ANNUNCIATOR | BT | BUS TIE | COND | COMMUNICATIONS | DSCW | DISCONNECT SWITCH |
| ANS | AMBIENT NOISE SENSOR | BTM | BOTTOM | CONN | CONCRETE | DSG | DIFFERING SITE CONDITIONS |
| AP | ALTERNATIVE PIPE | BTS | BASE TRANSCEIVER STATION | CONST | CONDUIT | DSHA | DIRECT SUSPENSION CONTACT WIRE |
| APC | ALTERNATIVE PIPE CULVERT | BTWN | BETWEEN | CONT | CONNECTOR, | DST | DISCONNECT SWITCH GROUP |
| APE | AREA OF POTENTIAL EFFECTS | BW | BARBED WIRE, | CONTR | CONNECTION | DTBB | DETERMINISTIC SEISMIC HAZARD ANALYSIS |
| APEFZ | ALQUIST-PRIOLO EARTHQUAKE FAULT ZONE | BWA | BALANCE WEIGHT | COORD | CONSTRUCT, | DTM | DISTRICT |
| API | APPLICATION PROGRAMMING INTERFACE | BWLAN | BALANCE WEIGHT ANCHOR | CORR | CONSTRUCTION | DVR | DOUBLE THRIE BEAM BARRIER |
| APPROX | APPROXIMATE | BZ | BROADBAND WIRELESS LOCAL AREA NETWORK | CP | CONTINUOUS, | DWG | DIGITAL TERRAIN MODEL |
| APU | ALTERNATIVE PIPE UNDERDRAIN | | BRONZE | CPT | CONTINUATION | DWY | DIGITAL VIDEO RECORDERS |
| AR | ACCESS RESTRICTION | | | CPU | CONTRACTOR | DXO | DRAWING |
| ARCH | ARCHITECTURAL | | | CR | COORDINATE | | DRIVEWAY |
| ARS | ACCELERATION RESPONSE SPECTRUM | | | CR | CORRIDOR | | DOUBLE CROSSOVER |
| AS | AGGREGATE SUBBASE | | | CR | CONTROL POINT | | |
| ASPH | ASPHALT | | | CR | CONE PENETRATION TEST, | | |
| ASRP | ALUMINUM SPIRAL RIB PIPE | | | CR | CONTROL POWER TRANSFORMER | | |
| ASSY | ASSEMBLY | | | CR | CENTRAL PROCESSING UNIT | | |
| AT | AUTOTRANSFORMER, | | | CR | CREEK, | | |
| AT | AUTOMATIC TENSION | | | CR | CONDUIT RISER | | |
| ATC | AUTOMATIC TRAIN CONTROL | | | CR | COMBINED RELAY AND CONTROL PANEL | | |
| ATEL | ADMINISTRATIVE TELEPHONE | | | CR | CONTINUOUS REINFORCED CONCRETE PAVEMENT | | |
| ATM | ALONG TRACK MOVEMENT | | | CR | CONCRETED ROCK SLOPE PROTECTION | | |
| ATO | AUTOMATIC TRAIN OPERATION | | | CR | CLEAR RECOVERY ZONE | | |
| ATP | AUTOMATIC TRAIN PROTECTION | | | CR | CONTROL SWITCH | | |
| ATPB | ASPHALT TREATED PERMEABLE BASE | | | CR | CONSTRUCTION STAGING AREA | | |
| ATPM | ASPHALT TREATED PERMEABLE MATERIAL | | | CR | CORRUGATED STEEL PIPE | | |
| ATR | ABOVE TOP OF RAIL | | | CR | CORRUGATED STEEL PIPE ARCH | | |
| ATS | AUTOMATIC TRAIN SUPERVISION, | | | CR | CERAMIC TILE, | | |
| ATS | AUTOTENSIONED SYSTEM | | | CR | COURT, | | |
| AUX | AUXILIARY | | | CR | CURRENT TRANSFORMER/TRANSDUCER | | |
| AVE | AVENUE | | | CR | CEMENT TREATED BASE | | |
| AVG | AVERAGE | | | CR | CEMENT TREATED PERMEABLE BASE | | |
| AVL | AUTOMATIC VEHICLE LOCATION | | | CR | CEMENT TREATED PERMEABLE MATERIAL | | |
| AWG | AMERICAN WIRE GAUGE | | | CR | CENTER | | |
| | | | | CR | COUNTERSUNK | | |
| | | | | CR | COMBINED CURRENT TRANSFORMER AND | | |
| | | | | CR | VOLTAGE TRANSFORMER | | |
| | | | | CR | COUNTERWEIGHT TAIL WIRE | | |
| | | | | CR | COPPER | | |
| | | | | CR | CULVERT | | |
| | | | | CR | CURVE | | |
| | | | | CR | COVER | | |
| | | | | CR | CONTACT WIRE | | |
| | | | | CR | CONTACT WIRE ANCHOR | | |
| | | | | CR | CONTACT WIRE HEIGHT | | |
| | | | | CR | CONTINUOUSLY WELDED RAIL | | |
| | | | | CR | COUNTER WEIGHT | | |
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E CONTINUED

EOD EDGE OF DECK
EOS ELECTRICAL OPERATED SWITCH
EOW END OF WALL
EP EDGE OF PAVEMENT
EPBM EARTH PRESSURE BALANCING MACHINE
EPR ETHYLENE PROPYLENE RUBBER
EQ EQUAL,
EQUILATERAL
EQN EQUATION
EQUIP EQUIPMENT
ES EDGE OF SHOULDER,
EXTRA STRENGTH,
ELECTRICAL SECTION
ENVIRONMENTALLY SENSITIVE AREA
ESCA ESCALATOR
ESEW EMERGENCY SHOWER / EYE WASH
ESMT EASEMENT
ETCS EUROPEAN TRAIN CONTROL SYSTEM
ETEL EMERGENCY TELEPHONE
ETS EMERGENCY TRIP SYSTEM
ETW EDGE OF TRAVELED WAY
EW EACH WAY,
ENDWALL
EXC EXCAVATION
EXIST EXISTING
EXP EXPANSION
EXPO EXPOSED
EXWY EXPRESSWAY
EXT EXTERIOR

F

F/F FACE TO FACE
F&C FRAME AND COVER
F&G FRAME AND GRATE
FA FIRE ALARM
FACP FIRE ALARM CONTROL PANEL
FAS FIRE ALARM SYSTEM
FB FLAT BAR,
FLOOR BEAM,
FEEDER BREAKER
FURNISHED BY OTHERS
FC FARE COLLECTION
FD FLOOR DRAIN
FDC FIRE DEPARTMENT CONNECTION
FDN FOUNDATION
FDP FIBER DISTRIBUTION PANEL
FDR FEEDER
FDU FIBER DISTRIBUTION UNIT
FE FIRE EXTINGUISHER
FES FLARED END SECTION
FF FILTER FABRIC
FFJ FULL FEEDING JUMPER
FFL FINISHED FLOOR LEVEL
FG FINISHED GRADE
FH FIRE HYDRANT
FHC FIRE HOSE CABINET
FID FIRE INITIATING DEVICE
FIG FIGURE
FIN FINISH
FIRM FLOOD INSURANCE RATE MAPS
FJ FEEDER JUMPER
FL FLOW LINE
FLB FLOOR BEAM
FLH FLAT HEAD
FLR FLOOR
FNA FIRE NOTIFICATION APPLIANCE
FO FIBER OPTIC
FOC FIBER OPTIC CABLE,
FACE OF CURB
FOCN FIBER OPTIC CABLING NETWORK
FOF FACE OF FINISH
FOP FACE OF POLE
FOS FACE OF STUDS,
FACTOR OF SAFETY
FP FULL PENETRATION
FPLM FULL SPAN PRECAST LAUNCHING
FPRF FIREPROOF
FPS FRAMES PER SECOND
FR FRAME
FREQ FREQUENCY
FS FINISHED SURFACE

F CONTINUED

FTEL FIRE TELEPHONE
FTG FOOTING
FTP FILE TRANSFER PROTOCOL
FTW FIXED END TAIL WIRE
FUT FUTURE
FW FEEDER WIRE
FWY FREEWAY
G1 ENTRANCE GRADE
G2 EXIT GRADE
G/L GROUND LINE
GALV GALVANIZED
GCL GRADING CONTROL LINE
GD GRADE
GHS GALVANIZED HIGH STRENGTH
GIGE GIGABIT ETHERNET
GIS GAS INSULATED SWITCH,
GEOGRAPHIC INFORMATION SYSTEM
GL GLASS
GMA GROUND MOTION ANALYSIS
GND GROUND
GO-95 PUC GENERAL ORDER 95
GP GRADING PLANE
GPS GLOBAL POSITIONING SYSTEM
GR GUARDRAIL,
GROUND ROD
GRP GLASS REINFORCED PLASTIC ROD
GRS GALVANIZED RIGID STEEL
GRX GRADE CROSSING
GSHA GEOLOGIC AND SEISMIC HAZARDS
ANALYSIS
GSP GALVANIZED STEEL PIPE
GT GENERAL INFORMATION
GTGM GEOTECHNICAL TECHNICAL GUIDANCE
MANUAL (FHWA)
GTR GUTTER
GW GUY WIRE
GYP GYPSUM
GYPBD GYPSUM BOARD

H

H/SPAN HEADSPAN
HAZ HAZARDOUS
HB HARDNESS BRINELL,
HOSE BIBB
HC HANDICAP
HD HARD DRAWN,
HORIZONTAL DRAIN
HDG HOT DIP GALVANIZED
HDPE HIGH DENSITY POLYETHYLENE
HDWE HARDWARE
HDWL HEADWALL
HEX HEXAGONAL
HH HANDHOLE,
HEAD HARDENED
HI HIGH
HI-RAIL HIGHWAY TO RAILROAD VEHICLE
HM HOLLOW METAL
HMA HOT MIXED ASPHALT
HMI HUMAN MACHINE INTERFACE
HO HAND OPERATED
HOR HORIZONTAL
HOV HIGH-OCCUPANCY VEHICLE
HP HIGH POINT,
HINGE POINT
HP&R HIGHWAY PLANTING AND RESTORATION
HPS HIGH PERFORMANCE STEEL
HR HANDRAIL
HRL HIGH RAIL LEVEL
HS HIGH STRENGTH
HSR HIGH-SPEED RAIL
HST HIGH-SPEED TRAIN
HT HIGH TEMPERATURE
HTR HEATER
HV HIGH VOLTAGE

H CONTINUED

HVAC HEATING VENTILATION AND AIR CONDITIONING
HW HIGH WATER
HWM HIGH WATER MARK
HWY HIGHWAY
I/O INPUT/OUTPUT
IB IMPEDANCE BOND
IBC INTERNATIONAL BUILDING CODE
IDS INTRUSTION DETECTION CODE
IIMP INTEGRATED INFORMATION MANAGEMENT PLATFORM
IJ INSULATED JOINT
IJP INSULATED JOINT PLUG
INSR INSULATOR
INST INSTANTANEOUS
INSUL INSULATION
INT INTERIOR
Inter-LATA INTER-LOCAL ACCESS AND TRANSPORT
AREA
INV INVERT
IR IN-RUNNING (RIDING CONTACT WIRE)
IRR IRRIGATION
I/S IN-SPAN
I/SJ IN-SPAN JUMPER

I

J JUMPER
JAN JANITOR
JB JUNCTION BOX
JCT JUNCTION
JP JOINT POLE
JT(S) JOINT(S)

L

LA LANDSCAPE ARCHITECT,
LIGHTNING ARRESTER
LAM LAMINATE
LAN LOCAL AREA NETWORK
LAT LATITUDE
LAV LAVATORY
LC LANDSCAPE CONTRACTOR
LCB LEAN CONCRETE BASE
LCX LOWER-LEVEL DESIGN BASIS EARTHQUAKE
LDBE LEAKY COAXIAL RADIO CABLE
LED LIGHT EMITTING DIODE
LF LINEAR FEET
LG LONG
LGT LIGHT,
LIGHTING
LH LEFT-HAND
LKR LOCKER
LL LIGHT LOADING
LLT LAST LONG TIE
LN LANE
LO LOCKOUT
LOC LOCATION
LOL LAYOUT LINE
LONG LONGITUDE,
LONGITUDINAL
LOS LEVEL OF SERVICE
LOTB LOGS OF TEST BORINGS
LP LOW POINT,
LOW PROFILE
LPL LIGHT POLE
LR LOW RAIL
LRFD LOAD AND RESISTANCE FACTOR DESIGN
LRT LIGHT RAIL TRANSIT
LRV LIGHT RAIL VEHICLE
LS LANDSCAPING,
LUMP SUM
LT LEFT
LV LOW VOLTAGE
LVL LEVEL
LVT LOW VIBRATION TRACK
LWP LOWER WORKING POINT

M

M MEDIUM LOADING
MAINT MAINTENANCE
MAT MATERIAL
MAX MAXIMUM
MB METAL BEAM
MBB METAL BEAM BARRIER
MBGR METAL BEAM GUARD RAILING
MCC MAINTENANCE CONTROL CENTER
MCE MAXIMUM CONSIDERED EARTHQUAKE
MCR MASTER CONTROL ROOM
MDS MOBILE DATA SYSTEM
MECH MECHANICAL
MED MEDIAN
MEM MEMBRANE
MESSGR MESSENGER WIRE
MET METAL
MFR MANUFACTURER
MH MANHOLE
MHHW MEAN HIGHEST HIGH WATER
MI MILD IRON
MIN MINIMUM
MISC MISCELLANEOUS
MKR MARKER
ML MAIN LINE
MLLW MEAN LOWER LOW WATER
MMIS MAINTENANCE MANAGEMENT INFORMATION SYSTEM
MO MASONRY OPENING
MOC MOTOR OPERATED CONTRACTOR
MOD MODIFIED,
MODIFY
MODC MOTOR OPERATED DISCONNECT SWITCH
MOI MAINTENANCE OF INFRASTRUCTURE
MON MONUMENT
MOP MOTOR OPERATED
MOS MANUALLY OPERATED SWITCH
MOV METAL-OXIDE VARISTOR
MOW MAINTENANCE OF WAY
MP MILEPOST
MPA MIDPOINT ANCHOR
MPLS MULTI-PROTOCOL LABEL SWITCHING
MR MOVEMENT RATING
MSE MECHANICALLY STABILIZED EMBANKMENT
MSF MAINTENANCE AND STORAGE FACILITY
MSL MEAN SEA LEVEL
MTD MEMO TO DESIGNERS (CALTRANS),
MOUNTED
MULLION
MVC MINIMUM VERTICLE CLEARANCE
MW MESSENGER WIRE

N

N NORTH
N/A NOT APPLICABLE
NAVD NORTH AMERICAN VERTICAL DATUM
NB NORTHBOUND
NBR NONBRIDGING
NCL NO COLLAPSE PERFORMANCE LEVEL
NDP NONLINEAR DYNAMIC PROCEDURE
NEC NATIONAL ELECTRICAL CODE
NEG NEGATIVE
NEUT NEUTRAL
NF NEGATIVE FEEDER,
NEAR FACE
NGVD NATIONAL GEODETIC VERTICAL DATUM
NI NETWORK INTERFACE
NIC NOT IN CONTRACT
NMS NETWORK MANAGEMENT SYSTEM
NO. NUMBER
NO NORMALLY OPEN
NOM NOMINAL
NP NETWORK PORT
NPRM NOTICE OF PROPOSED RULE MAKING
NPS NOMINAL PIPE SIZE
NR NOT REGISTERED
NS NOT SUPPORTED
NT NETWORK
NTP NETWORK TIME PROTOCOL,
NOTICE TO PROCEED
NTS NETWORK TIME SERVER,
NOT TO SCALE

CALIFORNIA HIGH-SPEED TRAIN PROJECT
DIRECTIVE DRAWING

ACRONYMS AND ABBREVIATIONS 2

CONTRACT NO.

DRAWING NO.
DD-GE-101

SCALE
NO SCALE

SHEET NO.

PARSONS
BRINCKERHOFF




CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

DESIGNED BY
R. MINCIO
DRAWN BY
V. HUANTE
CHECKED BY
S. MILITELLO
IN CHARGE
J. CHIRCO
DATE
01/24/2014

| REV | DATE | BY | CHK | APP | DESCRIPTION |
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04/02/2014 - RFP No.: HSR 13-57

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| | | | | | | DESIGNED BY R. MINCIO | | PARSONS BRINCKERHOFF |  | CALIFORNIA HIGH-SPEED TRAIN PROJECT DIRECTIVE DRAWING | CONTRACT NO. |
| | | | | | | DRAWN BY V. HUANTE | | | | | DRAWING NO. DD-GE-102 |
| | | | | | | CHECKED BY S. MILITELLO | | | | | SCALE NO SCALE |
| | | | | | | IN CHARGE J. CHIRCO | | | | | SHEET NO. |
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T CONTINUED

W CONTINUED

TRACK GEOMETRY - HORIZONTAL

UNITS OF MEASUREMENT

TTC TWO TRACK CANTILEVER
TTEL TRAIN EMERGENCY SPEAKERPHONE
TV TELEVISION
TVM(S) TICKET VENDING MACHINE(S)
TW TIE WIRE
TYP TYPICAL

WS WATER SURFACE,
WORK STATION
WSP WELDED STEEL PIPE
WT WEIGHT
WV WATER VALVE
WW WINGWALL,
WALKWAY
WWF WELDED WIRE FABRIC
WWLOL WINGWALL LAYOUT LINE
WWM WELDED WIRE MESH

BC BEGIN HORIZONTAL CURVE
CC COMPOUND CURVE
CS POINT OF CHANGE FROM CIRCULAR CURVE TO SPIRAL
K1 TANGENT DISTANCE PF SHIFT PC
REFERENCE TO THE TS
K2 TANGENT DISTANCE PF SHIFT PT
REFERENCE TO THE ST
Lc LENGTH OF CIRCULAR CURVE
Ls1 LENGTH OF SPIRAL
Ls2 LENGTH OF SPIRAL FROM TS TO SC
LSc LENGTH OF SPIRAL FROM CS TO ST
LVC LENGTH OF COMPOUND SPIRAL FROM CS TO SC
p1 OFFSET FROM INITIAL TANGENT TO PC OF THE SHIFTED
CIRCLE OF SPIRALIZED CURVE
p2 OFFSET FROM INITIAL TANGENT TO PT OF THE SHIFTED
CIRCLE OF SPIRALIZED CURVE
PC POINT OF CURVATURE
PCC POINT OF COMPOUND CURVE
PF POINT OF FROG
PI POINT OF INTERSECTION
PITO POINT OF INTERSECTION TURNOUT
POC POINT ON HORIZONTAL CURVE
POE POINT OF ENDING
POS POINT ON SPIRAL,
POVC POINT ON VERTICAL CURVE
POVT POINT ON VERTICAL TANGENT
PRC POINT OF REVERSE CURVE
PRVC POINT OF REVERSE VERTICAL CURVE
PS POINT OF SWITCH
PT POINT OF TANGENT

Ac ACRES
AMP AMPERES
BTU BRITISH THERMAL UNIT
CAL CALIPER
CF CUBIC FEET
CP CANDLE POWER
CY CUBIC YARD
dB DECIBEL
DEG DEGREE
DIA DIAMETER
Eu UNBALANCED SUPERELEVATION
F FARENHEIT
FT FOOT,
FEET
g ACCELERATION DUE TO GRAVITY
GA GAUGE
GAL GALLON
GB GIGABYTE
GBPS GIGABITS PER SECOND
GHz GIGAHERTZ
HR HOUR
HT HEIGHT
Hz HERTZ
ID INSIDE DIAMETER
IF INSIDE FACE
IN INCHES
IR INSIDE RADIUS

U/S UNDERSIDE
UB UTILITY BOX
UC UNDERCROSSING
UD UNDERDRAIN
UG UNDERGROUND,
UNDER GRADE
UGB UNDERGRADE BRIDGE
UI USER INTERFACE
UNF UNFINISHED
UNINS UNINSULATED
UON UNLESS OTHERWISE NOTED
UP UNDERPASS
UPS UNINTERRUPTIBLE POWER SUPPLY
UR URINAL
UrEDAS URGENT EARTHQUAKE DETECTION AND
ALARM SYSTEM
USCS UNITED SOIL CLASSIFICATION SYSTEM
UTIL UTILITY
UTP UNSHIELDED TWISTED PAIR
UWP UPPER WORKING POINT

X/CAT CROSS CANTENARY
X/SPAN CROSS SPAN
XD TRANSDUCER
XFMR TRANSFORMER
XO CROSSOVER
XO ST CROSSOVER SPRING TENSIONER
XSEC CROSS SECTION
XING CROSSING
XMITTER TRANSMITTER

SC POINT OF CHANGE FROM SPIRAL TO
CIRCULAR CURVE
SPO POINT ON ORIGIN OF COMPOUND SPIRAL
SS POINT OF CHANGE BETWEEN SPIRALS
SSC SPIRAL TO SPIRAL POINT OF CURVATURE
ST POINT OF CHANGE FROM SPIRAL TO TANGENT
TC POINT OF CHANGE FROM TANGENT TO CURVE
TS POINT OF CHANGE FROM TANGENT TO SPIRAL
Ts1 TANGENT DISTANCE FROM TS TO PI
Ts2 TANGENT DISTANCE FROM ST TO PI
Xs1 TANGENT OFFSET AT THE SC
Xs2 TANGENT OFFSET AT THE CS
Ys1 TANGENT DISTANCE AT THE SC
Ys2 TANGENT DISTANCE AT THE CS
Δ TOTAL CENTRAL ANGLE OF THE SPIRALIZED CURVE
Δc CENTRAL ANGLE OF CIRCULAR CURVE (Lc) FROM
SC TO CS
Δc1 CENTRAL ANGLE OF FIRST CIRCULAR CURVE OF
COMPOUND CURVATURE
Δc2 CENTRAL ANGLE OF SECOND CIRCULAR CURVE OF
COMPOUND CURVATURE
θs1 CENTRAL ANGLE OF SPIRAL LENGTH Ls1 OR SPIRAL
ANGLE OF FIRST SPIRAL IN SPIRALIZED CURVE
θs2 CENTRAL ANGLE OF SPIRAL LENGTH Ls2 OR SPIRAL
ANGLE OF SECOND SPIRAL IN SPIRALIZED CURVE
θsc CENTRAL ANGLE OF COMPOUND SPIRAL OR COMPOUND
SPIRAL ANGLE FROM CS TO SC

K KIPS (1000 POUNDS)
KCMIL THOUSAND CIRCULAR MILS
KHz KILOHERTZ
KSF KIPS PER SQAURE FOOT
KSI KIPS PER SQUARE INCH
kV KILOVOLTS
KVA KILOVOLT-AMPERE
KVAR KILOVOLT-AMPERE REACTIVE
kW KILOWATT
KWH/D KILOWATT HOUR / DEMAND
L LENGTH
LB POUNDS
LB/FT POUNDS PER FOOT
LF LINEAR FEET
m METER
MBPS MEGA-BITS PER SECOND
MCM THOUSAND CIRCULAR MILS
MHz MEGAHERTZ
mm MILLIMETER
MPH MILES PER HOUR
MVA MEGAVOLT-AMPERE
MW MEGA WATT
OD OUTSIDE DIAMETER
PSF POUNDS PER SQUARE FOOT
PSI POUNDS PER SQUARE INCH
PSIG POUNDS PER SQUARE INCH GAUGE

V DESIGN SPEED,
VALVE
VAC VOLTS ALTERNATING CURRENT
VAR VARIABLE,
VARIES,
VOLT-AMPERE REACTIVE
VCAT VIRTUAL CONCATENATION
VCP VITRIFIED CLAY PIPE
VCT VINYL COMPOSITION TILE
VDC VOLT DC
VE VALUE ENGINEERING
VERT VERTICAL
VEST VESTIBULE
VIA VIADUCT
VLAN VIRTUAL LOCAL AREA NETWORK
VMS VARIABLE MESSAGE SIGN,
VARIABLE MESSAGE SYSTEM,
VOLTIMETER
VOLUME
VOIP VOICE OVER INTERNET PROTOCOL
VPN VIRTUAL PRIVATE NETWORK
VRCS VOICE RADIO COMMUNICATIONS SYSTEM
VS VOLTAGE SWITCH
VT VOLTAGE TRANSFORER/TRANSDUCER

W

W WEST,
WIDTH
W/ WITH
W/O WITHOUT
WA WORK AREA
WB WESTBOUND
WC WATER CLOSET
WCS WIRELESS COMMUNICATIONS SYSTEM
WD WOOD
WLAN WIRELESS LOCAL AREA NETWORK
WM WIRE MESH
WP WORK POINT,
WOOD POLE
WPF WATERPROOF
WPC WAYSIDE POWER CUBICLES
WR WIRE RUN
WRT WITH RESPECT TO

TRACK GEOMETRY - VERTICAL

BVC BEGIN VERTICAL CURVE
Ea ACTUAL SUPERELEVATION
EVC END VERTICAL CURVE
PCVC POINT OF COMPOUND VERTICAL CURVE
POVC POINT OF VERTICAL INTERSECTION
POVT POINT ON VERTICAL CURVE
PVI POINT ON VERTICAL TANGENT
VC VERTICAL CURVE
VPI VERTICAL POINT OF INTERSECTION

SEC SECOND
SF SQUARE FEET
SY SQUARE YARD
TF TRACK FEET
VA VOLTS
VAC VOLT-AMPERE
Y YARDS
YR(S) YEAR(S)

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| DESIGNED BY R. MINCIO |
| DRAWN BY V. HUANTE |
| CHECKED BY S. MILITELLO |
| IN CHARGE J. CHIRCO |
| DATE 01/24/2014 |

PARSONS
BRINCKERHOFF



CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
DIRECTIVE DRAWING

ACRONYMS AND ABBREVIATIONS 4

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04/02/2014 - RFP No.: HSR 13-57

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California High-Speed Rail Authority



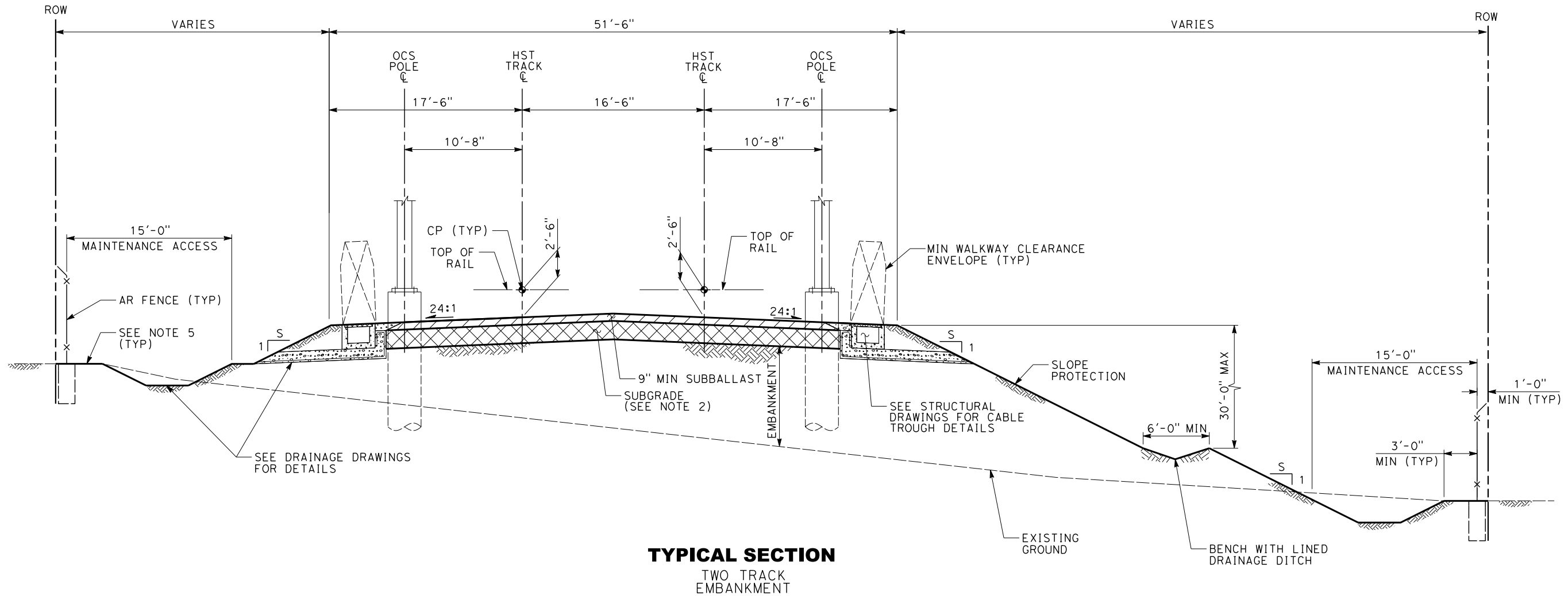
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**Request for Proposals for Design-Build
Services for Construction Package 2-3**

**Book III, Part B.1
Directive Drawings**

Civil

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NOTES:

1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. SUBGRADE THICKNESS SHALL BE DETERMINED BASED ON THE EXISTING GROUND CONDITION.
3. THE CONTROL POINT (CP) SHALL BE 2'-6" ABOVE THE TOP OF SUBBALLAST.
4. FOR EMBANKMENT SLOPE GRADING, S=2 (MIN).
5. PROTECTIVE BARRIER, SUCH AS A BERM OR A DIKE, SHALL BE INSTALLED AT THE RIGHT-OF-WAY BOUNDARY TO INTERCEPT STORM WATER RUN OFF, WHERE THERE IS A POTENTIAL FOR STORM WATER RUN OFF TO ENTER CHST RIGHT-OF-WAY FROM ADJACENT PROPERTY.



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| DESIGNED BY D. MANITI |
| DRAWN BY V. HUANTE |
| CHECKED BY G. HARRIS |
| IN CHARGE G. LUSHEROVICH |
| DATE 01/24/2014 |

**PARSONS
BRINCKERHOFF**



CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

**CALIFORNIA HIGH-SPEED TRAIN PROJECT
CIVIL DIRECTIVE**

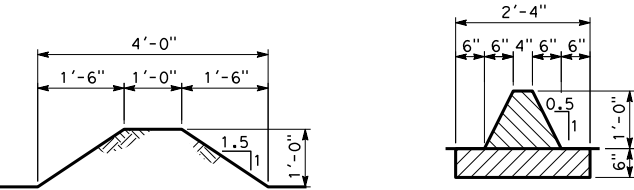
TYPICAL CROSS SECTION
TWO TRACK
EMBANKMENT

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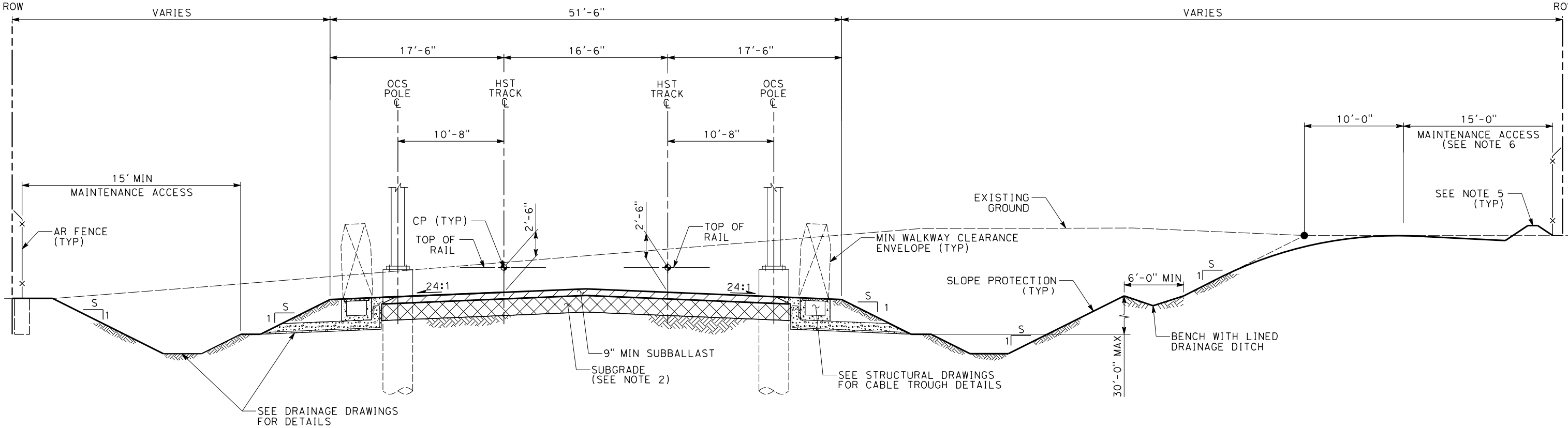
NOTES:

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6. A 20-FOOT MAINTENANCE ACCESS IS REQUIRED FOR CUT SLOPES HIGHER THAN 30 FEET.



BERM AC DIKE

PROTECTIVE BARRIER DETAILS
(SEE NOTE 5)



TYPICAL SECTION
TWO TRACK
OPEN CUT



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| DRAWN BY R. MINCIO |
| CHECKED BY G. HARRIS |
| IN CHARGE G. LUSHEROVICH |
| DATE 01/24/2014 |

PARSONS
BRINCKERHOFF



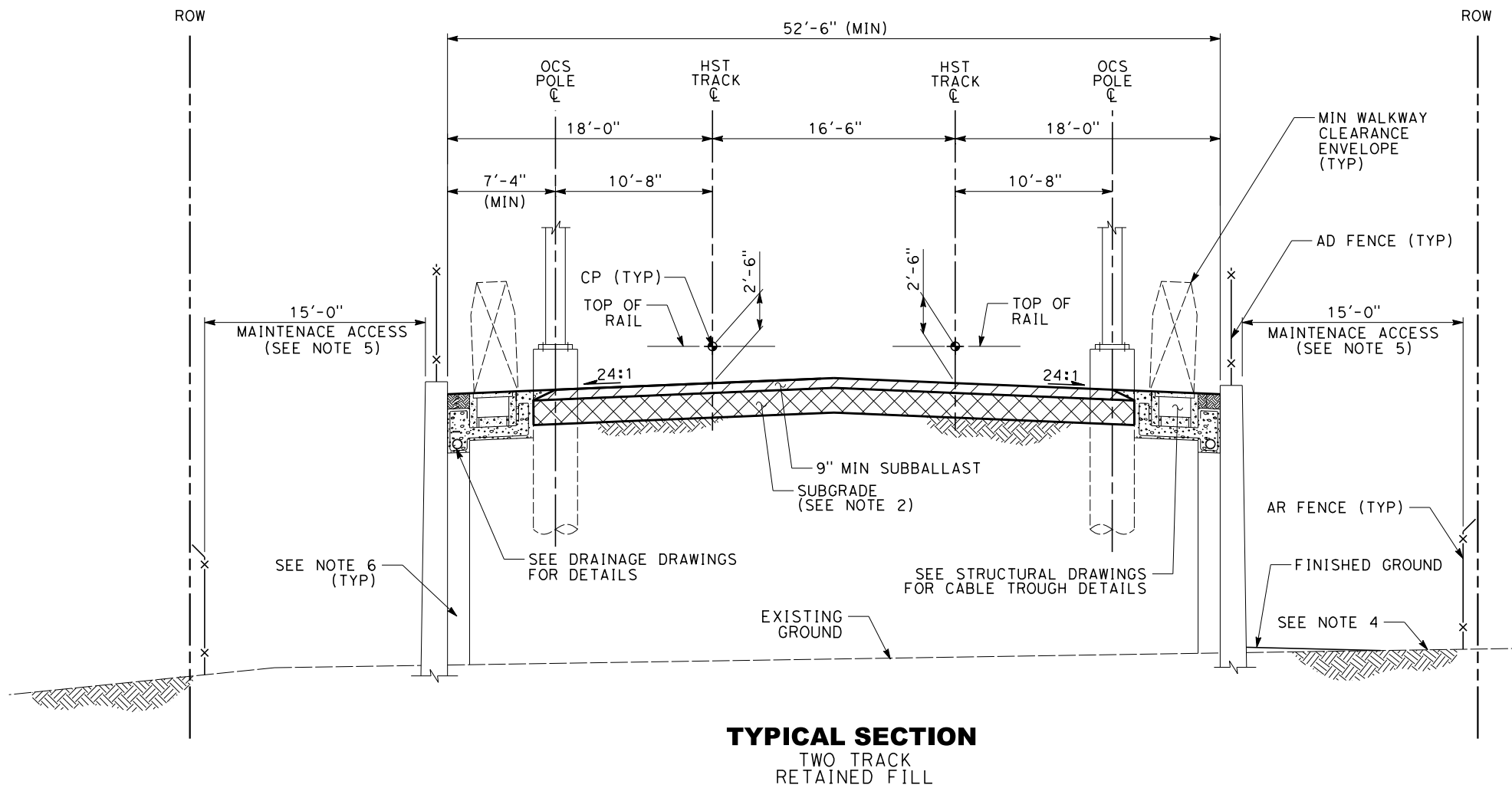
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CALIFORNIA HIGH-SPEED TRAIN PROJECT
CIVIL DIRECTIVE

TYPICAL CROSS SECTION
TWO TRACK
OPEN CUT

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NOTES:

1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. SUBGRADE THICKNESS SHALL BE DETERMINED BASED ON THE EXISTING GROUND CONDITION.
3. THE CONTROL POINT (CP) SHALL BE 2'-6" ABOVE THE TOP OF SUBBALLAST.
4. PROTECTIVE BARRIER, SUCH AS A BERM OR A DIKE, SHALL BE INSTALLED AT THE RIGHT-OF-WAY BOUNDARY TO INTERCEPT STORM WATER RUN OFF, WHERE THERE IS A POTENTIAL FOR STORM WATER RUN OFF TO ENTER CHST RIGHT-OF-WAY FROM ADJACENT PROPERTY.
5. 10' MIN MAINTENANCE ACCESS REQUIRED WHEN THERE IS NO FENCE OR CONTINUOUS OBSTRUCTION.
6. PROVIDE APPROPRIATE DRAINAGE SYSTEM FOR THE TYPE OF RETAINING WALL.



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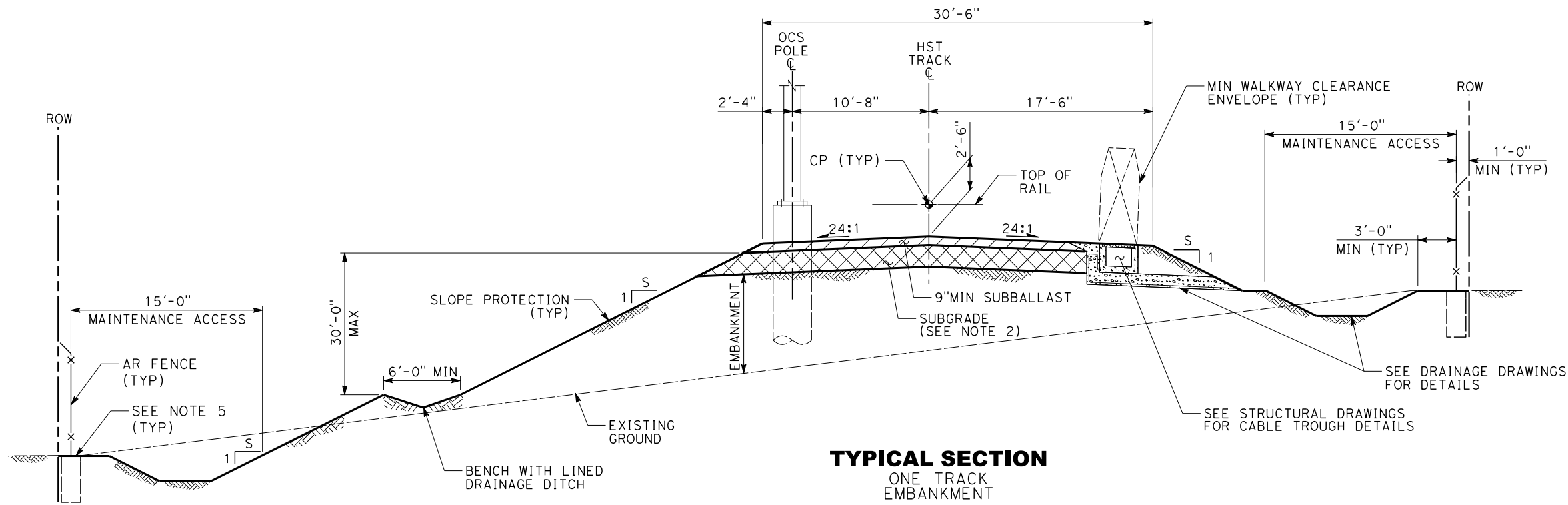
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| DESIGNED BY S. MILITELLO |
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| IN CHARGE G. LUSHEROVICH |
| DATE 08/29/2014 |



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| CALIFORNIA HIGH-SPEED TRAIN PROJECT CIVIL DIRECTIVE |
| TYPICAL CROSS SECTION TWO TRACK RETAINED FILL |

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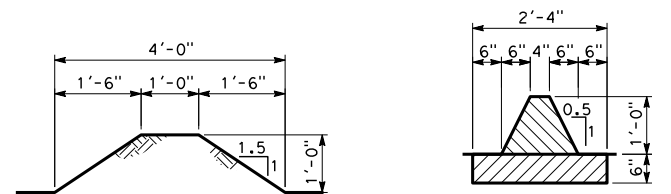
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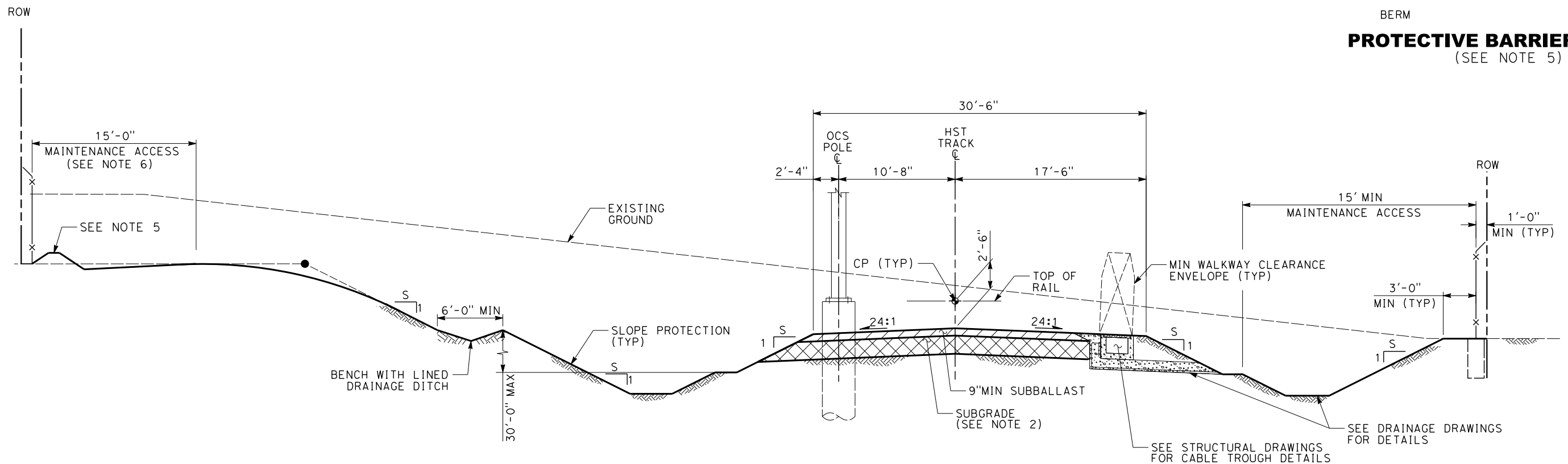
TYPICAL SECTION
ONE TRACK
EMBANKMENT

NOTES:

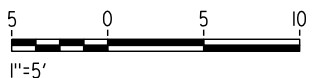
1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. SUBGRADE THICKNESS SHALL BE DETERMINED BASED ON THE EXISTING GROUND CONDITION.
3. THE CONTROL POINT (CP) SHALL BE 2'-6" ABOVE THE TOP OF SUBBALLAST.
4. FOR EMBANKMENT SLOPE GRADING, S=2 (MIN).
5. PROTECTIVE BARRIER, SUCH AS A BERM OR A DIKE, SHALL BE INSTALLED AT THE RIGHT-OF-WAY BOUNDARY TO INTERCEPT STORM WATER RUN OFF, WHERE THERE IS A POTENTIAL FOR STORM WATER RUN OFF TO ENTER CHST RIGHT-OF-WAY FROM ADJACENT PROPERTY.
6. A 20-FOOT MAINTENANCE ACCESS IS REQUIRED FOR CUT SLOPES HIGHER THAN 30 FEET.



PROTECTIVE BARRIER DETAILS
(SEE NOTE 5)



TYPICAL SECTION
ONE TRACK
OPEN CUT



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| DESIGNED BY D. MANITI |
| DRAWN BY R. MINCIO |
| CHECKED BY G. HARRIS |
| IN CHARGE G. LUSHEROVICH |
| DATE 01/24/2014 |

**PARSONS
BRINCKERHOFF**



CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

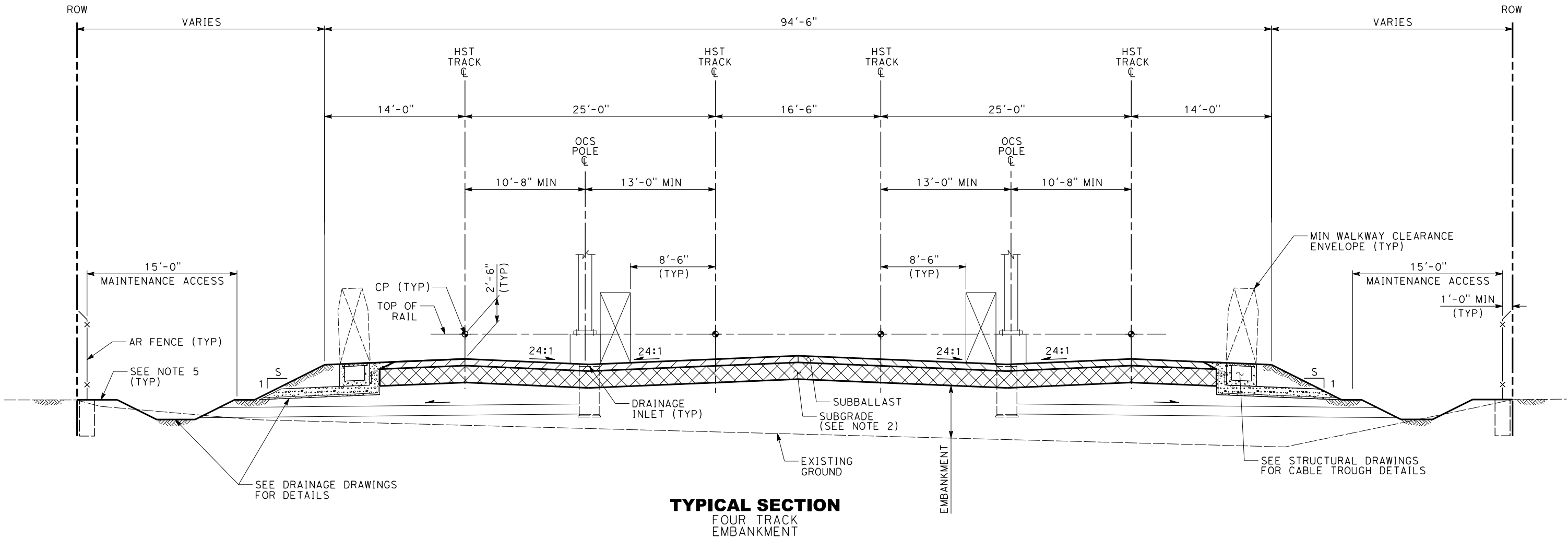
**CALIFORNIA HIGH-SPEED TRAIN PROJECT
CIVIL DIRECTIVE**

TYPICAL CROSS SECTION
ONE TRACK
EMBANKMENT AND OPEN CUT

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- NOTES:**
1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
 2. SUBGRADE THICKNESS SHALL BE DETERMINED BASED ON THE EXISTING GROUND CONDITION.
 3. THE CONTROL POINT (CP) SHALL BE 2'-6" ABOVE THE TOP OF SUBBALLAST.
 4. FOR EMBANKMENT SLOPE GRADING, S=2 (MIN).
 5. PROTECTIVE BARRIER, SUCH AS A BERM OR A DIKE, SHALL BE INSTALLED AT THE RIGHT-OF-WAY BOUNDARY TO INTERCEPT STORM WATER RUN OFF, WHERE THERE IS A POTENTIAL FOR STORM WATER RUN OFF TO ENTER CHST RIGHT-OF-WAY FROM ADJACENT PROPERTY.



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| DESIGNED BY D. MANITI |
| DRAWN BY R. MINCIO |
| CHECKED BY G. HARRIS |
| IN CHARGE G. LUSHEROVICH |
| DATE 01/24/2014 |

**PARSONS
BRINCKERHOFF**



CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

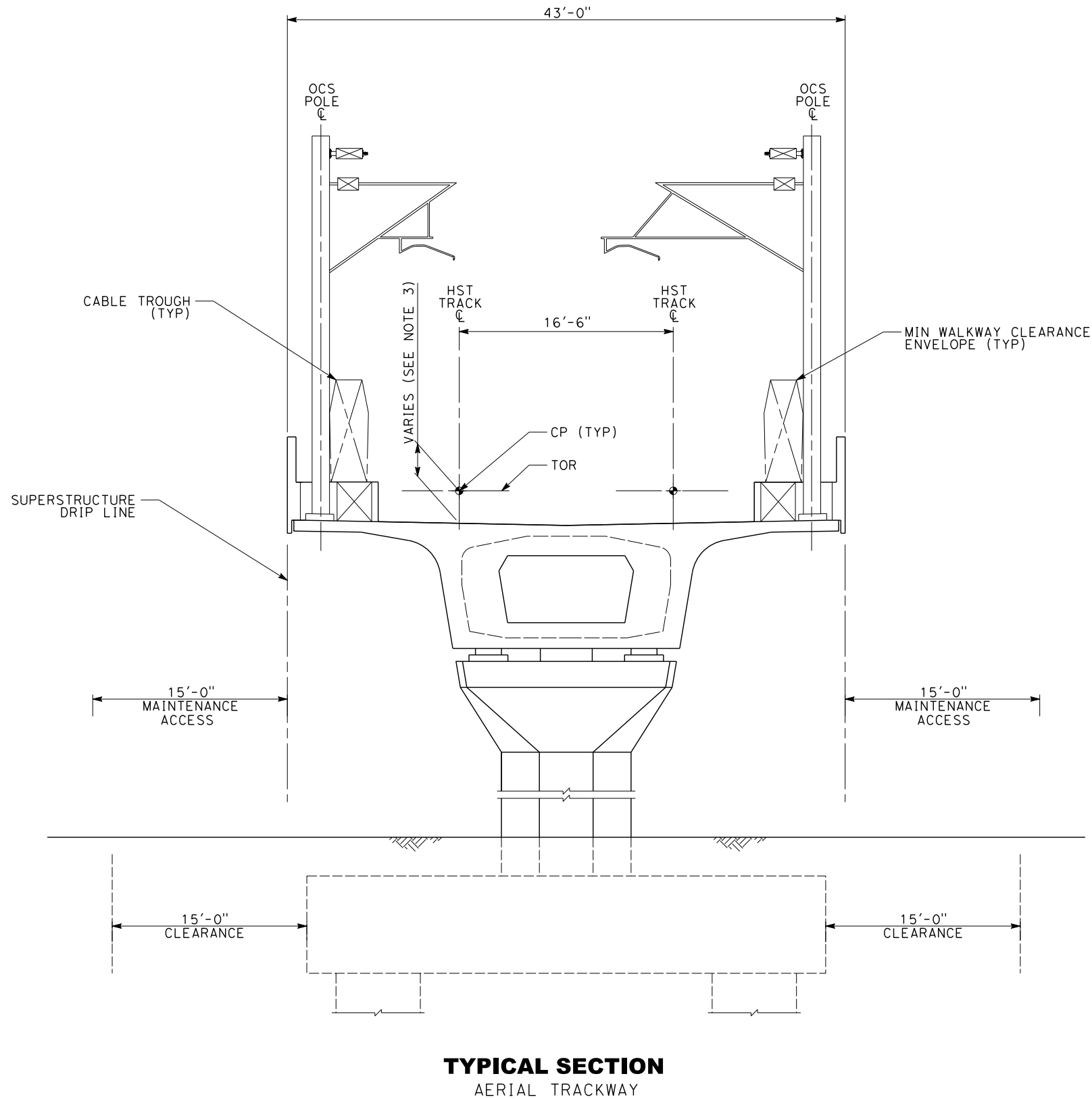
**CALIFORNIA HIGH-SPEED TRAIN PROJECT
CIVIL DIRECTIVE**

TYPICAL CROSS SECTION
FOUR TRACK
EMBANKMENT

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NOTES:

1. STRUCTURE, TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. SUBGRADE THICKNESS SHALL BE DETERMINED BASED ON THE EXISTING GROUND CONDITION.
3. THE CONTROL POINT (CP) SHALL BE 2'-6" ABOVE THE TOP OF STRUCTURE WITH NON-BALLASTED TRACK. FOR BALLASTED TRACK THE CONTROL POINT (CP) SHALL BE LOCATED ABOVE STRUCTURE DECK AT A DISTANCE 2'-9" PLUS ALLOWANCE FOR WATER PROOFING MEMBRANE AND PROTECTION LAYER (IF REQUIRED).
4. PROTECTIVE BARRIER, SUCH AS A BERM OR A DIKE, SHALL BE INSTALLED AT THE RIGHT-OF-WAY BOUNDARY TO INTERCEPT STORM WATER RUN OFF, WHERE THERE IS A POTENTIAL FOR STORM WATER RUN OFF TO ENTER CHST RIGHT-OF-WAY FROM ADJACENT PROPERTY.

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| DESIGNED BY D. MANITI |
| DRAWN BY R. MINCIO |
| CHECKED BY G. HARRIS |
| IN CHARGE G. LUSHEROVICH |
| DATE 01/24/2014 |

**PARSONS
BRINCKERHOFF**



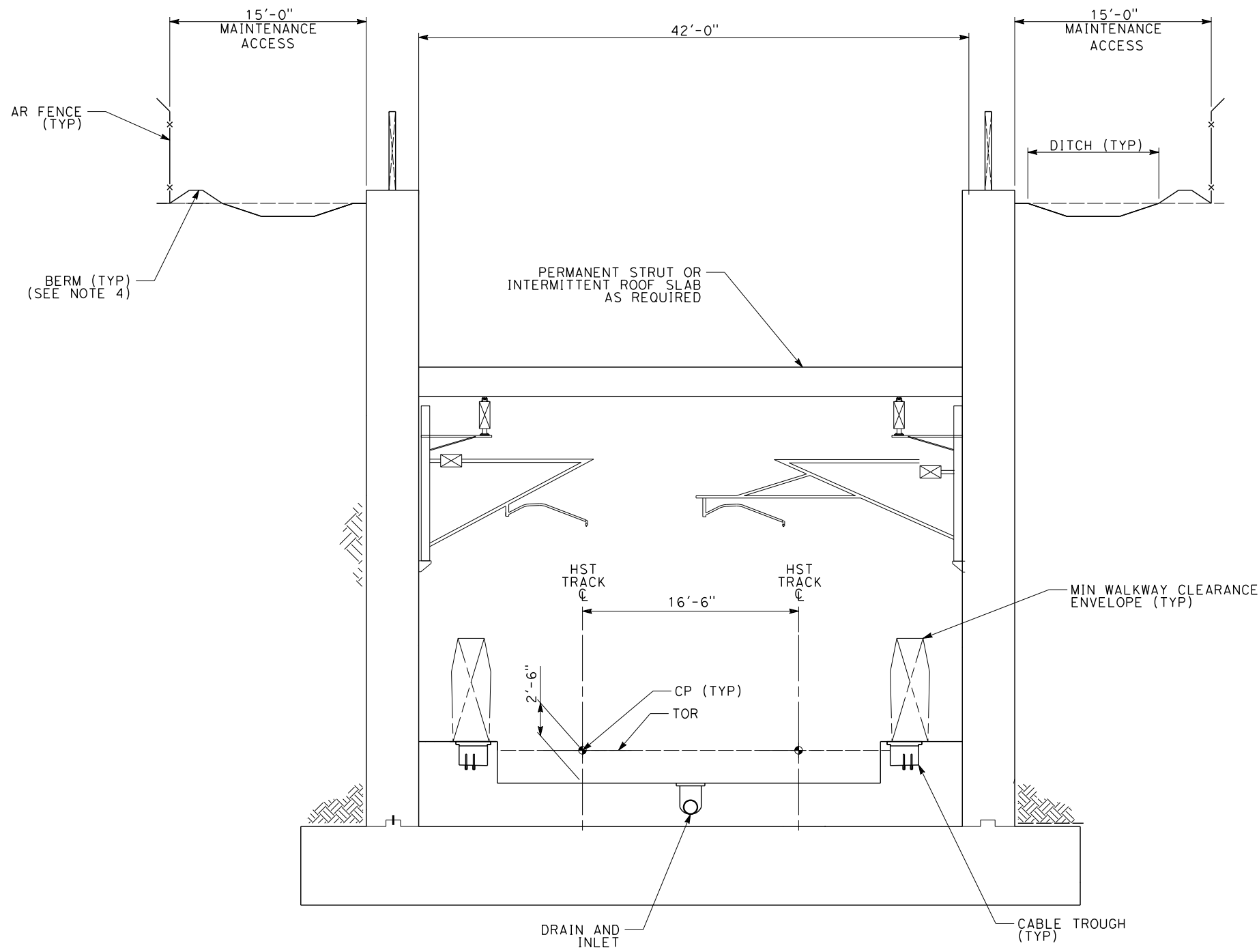
CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

**CALIFORNIA HIGH-SPEED TRAIN PROJECT
CIVIL DIRECTIVE**

TYPICAL CROSS SECTION
TWO TRACK
AERIAL TRACKWAY

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| CONTRACT NO. |
| DRAWING NO. DD-CV-105 |
| SCALE AS SHOWN |
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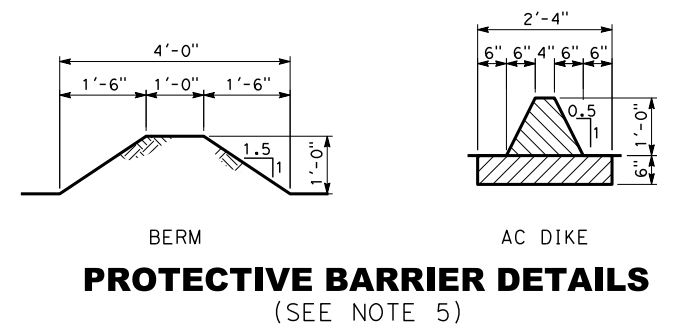
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TYPICAL SECTION
TRENCH

NOTES:

1. STRUCTURE, TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. SUBGRADE THICKNESS SHALL BE DETERMINED BASED ON THE EXISTING GROUND CONDITION.
3. THE CONTROL POINT (CP) SHALL BE 2'-6" ABOVE THE TOP OF SUBBALLAST.
4. PROTECTIVE BARRIER, SUCH AS A BERM OR A DIKE, SHALL BE INSTALLED AT THE RIGHT-OF-WAY BOUNDARY TO INTERCEPT STORM WATER RUN OFF, WHERE THERE IS A POTENTIAL FOR STORM WATER RUN OFF TO ENTER CHST RIGHT-OF-WAY FROM ADJACENT PROPERTY.



PROTECTIVE BARRIER DETAILS
(SEE NOTE 5)

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| DESIGNED BY D. MANITI |
| DRAWN BY R. MINCIO |
| CHECKED BY G. HARRIS |
| IN CHARGE G. LUSHEROVICH |
| DATE 01/24/2014 |

**PARSONS
BRINCKERHOFF**

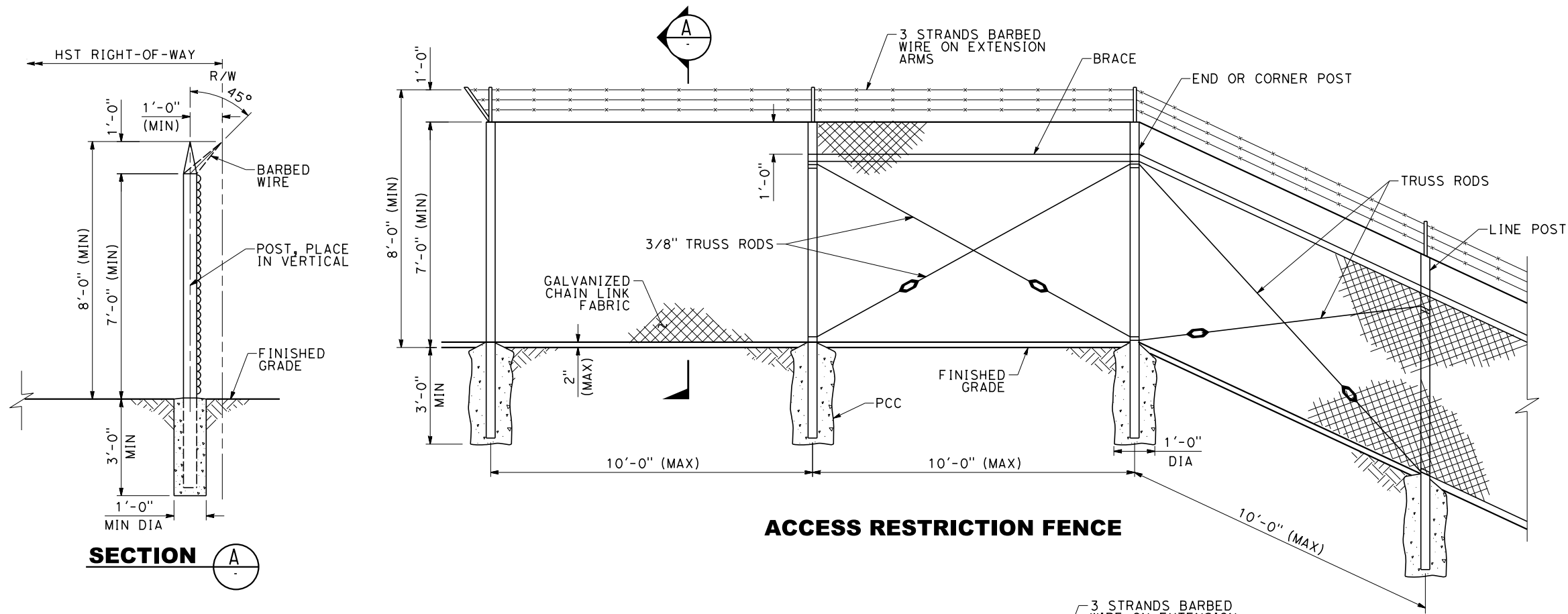


**CALIFORNIA HIGH-SPEED TRAIN PROJECT
CIVIL DIRECTIVE**

TYPICAL CROSS SECTION
TWO TRACK
TRENCH STRUCTURE

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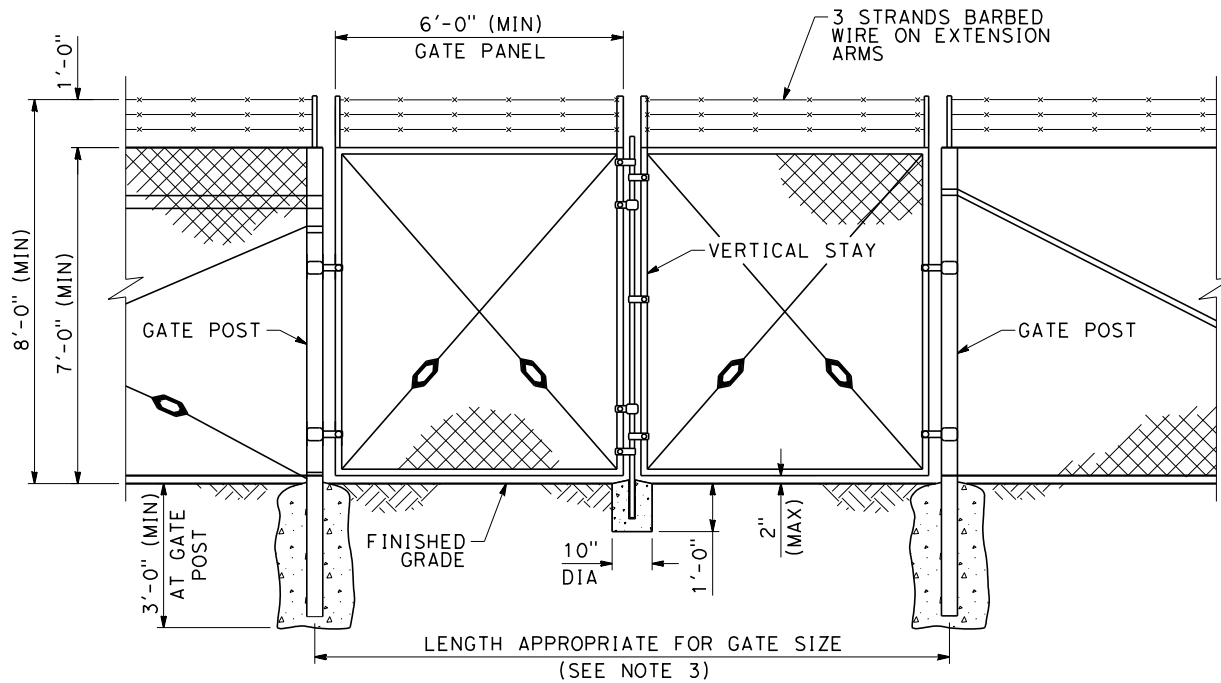
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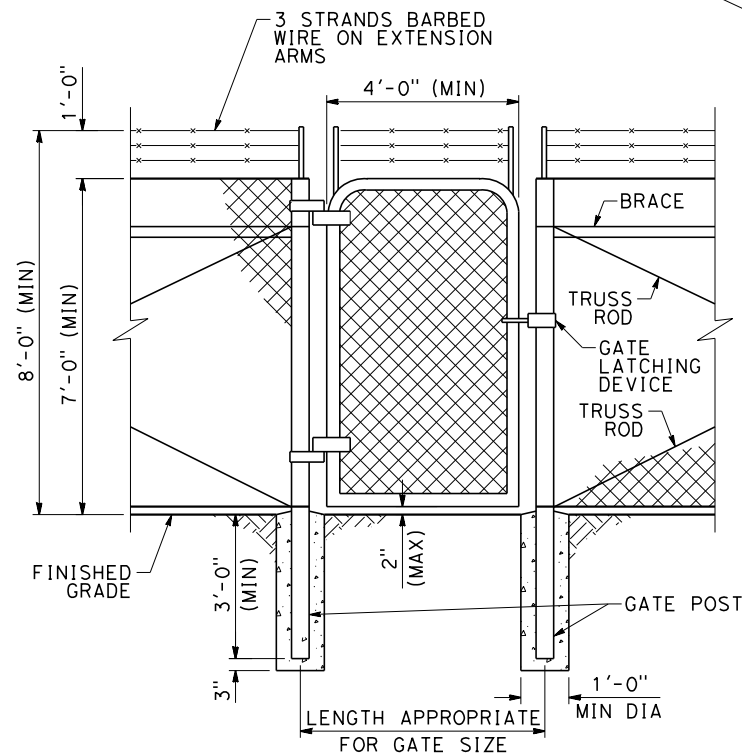
ACCESS RESTRICTION FENCE

NOTES:

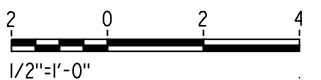
1. ALL PERMANENT FENCING AND GATES SHALL BE BONDED, GROUNDED AND INSULATED TO PREVENT ELECTRIC SHOCK.
2. ACCESS RESTRICTION (AR) FENCING SHALL BE 8 FEET HIGH MINIMUM (AS SHOWN HERE). ACCESS DETERRING (AD) FENCING (NOT SHOWN) SHALL BE 6 FEET HIGH, WITH NO BARBED WIRE.
3. GATES FOR VEHICULAR ACCESS (DRIVING GATES) SHALL BE SIZED IN COORDINATION WITH EMERGENCY RESPONDERS AND MAINTENANCE EQUIPMENT. IF NO OTHER INFORMATION IS AVAILABLE THESE GATES SHOULD HAVE A MINIMUM WIDTH OF 12 FEET.
4. GATES CAN EITHER BE SWINGING OR SLIDING TYPE. VEHICULAR ACCESS SWINGING GATES SHALL BE A PAIR AND SHALL BE HINGED FROM THE INSIDE. PROVISIONS SHALL BE MADE FOR SWINGING GATES TO SWING NOT LESS THAN 90 DEGREES AWAY FROM THE HST FACILITIES.
5. THIS DRAWING DEPICTS MINIMUM STANDARDS FOR RIGHT-OF-WAY FENCING AND GATE. ALTERNATIVE FENCE TYPE OF EQUIVALENT OR ENHANCED KIND MAY BE ALLOWED UPON APPROVAL OF THE AUTHORITY.
6. FENCE AND GATES SHALL BE DESIGNED AND INSTALLED TO NOT PRECLUDE FUTURE INSTALLATION OF TYPICAL FENCE MOUNTED ELECTRONIC ACCESS CONTROL.
7. FOR ADDITIONAL FENCE INSTALLATION DETAILS SEE CALTRANS STANDARD PLANS.



VEHICLE ACCESS GATE ALONG AR FENCE



PEDESTRIAN ACCESS GATE ALONG AR FENCE



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| DESIGNED BY S. MILITELLO |
| DRAWN BY V. LAVERDE |
| CHECKED BY A. ABTAHI |
| IN CHARGE G. LUSHEROVICH |
| DATE 08/29/2014 |

PARSONS
BRINCKERHOFF

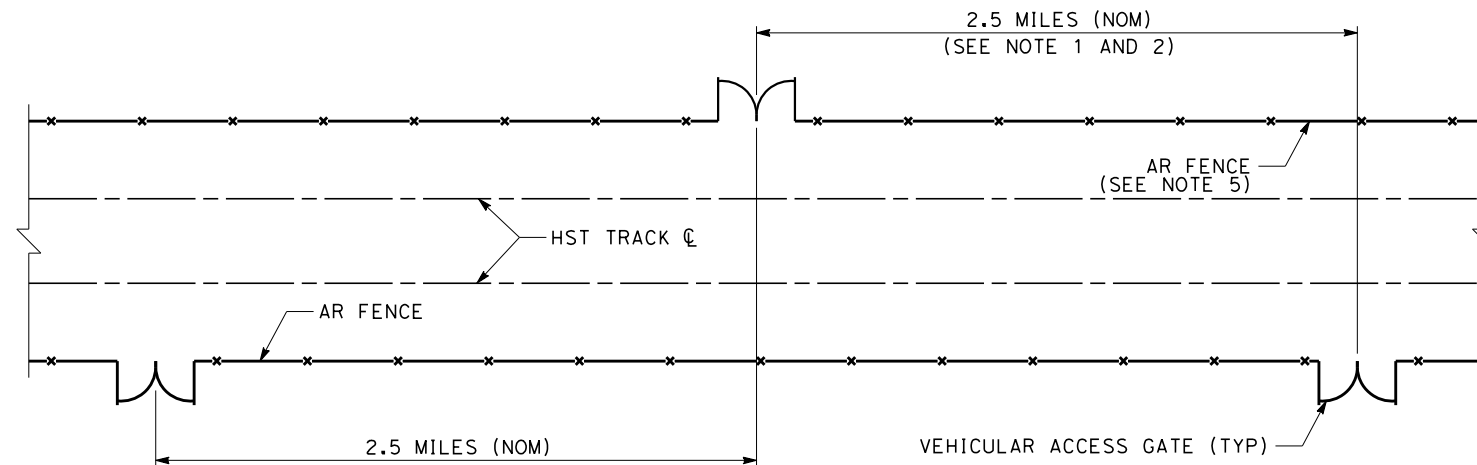


CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

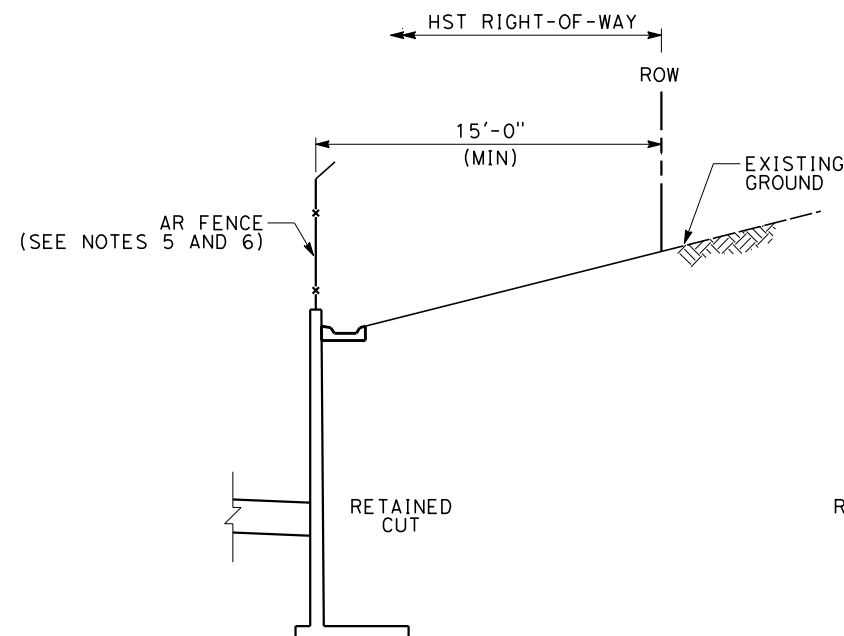
CALIFORNIA HIGH-SPEED TRAIN PROJECT
CIVIL DIRECTIVE

ACCESS RESTRICTION
FENCE AND GATE DETAILS

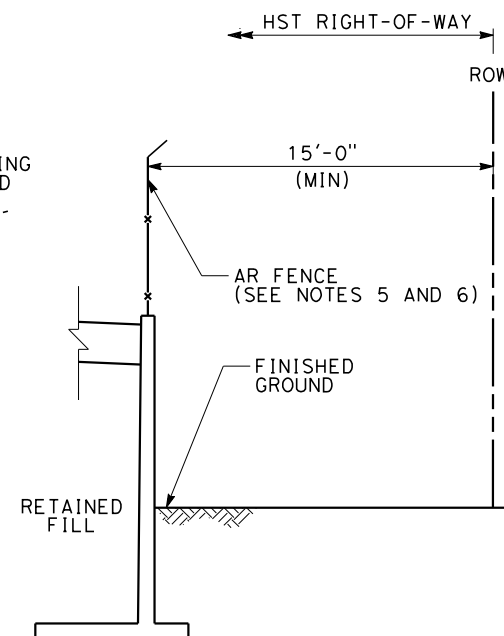
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| SCALE AS SHOWN |
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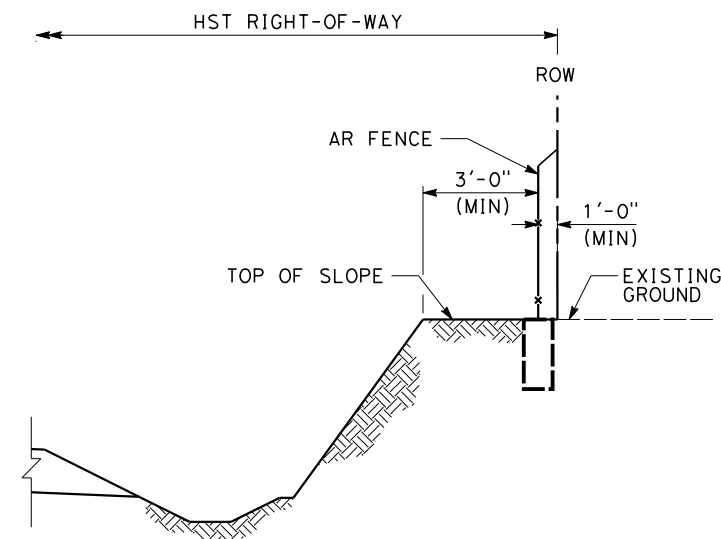
GATE LOCATIONS ALONG HST TRACKWAY



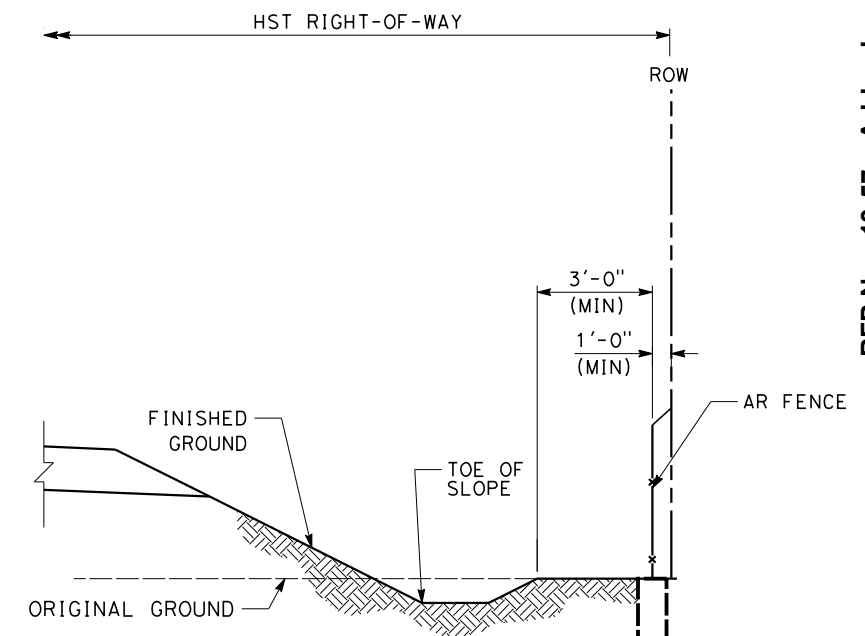
FENCE LOCATION ALONG HST TRACKWAY



FENCE LOCATION ALONG HST TRACKWAY



FENCE LOCATION ALONG HST TRACKWAY



FENCE LOCATION ALONG HST TRACKWAY

NOTES:

1. LOCATION OF GATES ALONG RIGHT-OF-WAY FENCING MAY REQUIRE COORDINATION WITH THE LOCAL FIRE PROTECTION AGENCY AND EMERGENCY RESPONDERS.
2. IN GENERAL VEHICULAR ACCESS GATE ALONG AT-GRADE TRACKWAY, SHALL BE LOCATED NOMINALLY AT 2.5 MILE INTERVALS AND COORDINATED WITH THE LOCATION OF HST WAYSIDE FACILITIES.
3. GATE LOCATIONS ALONG FENCING WITHIN FREEWAY RIGHT-OF-WAY REQUIRE CALTRANS APPROVAL.
4. VEHICULAR ACCESS GATES SHALL BE PROVIDED IN CONJUNCTION WITH EITHER ACCESS ROADS OR AT LOCATIONS WHERE EXISTING ROADS MAKE IT PRACTICABLE FOR MAINTENANCE AND EMERGENCY VEHICLE TO ACCESS THE TRACKWAY.
5. FOR ADDITIONAL DETAILS SEE CIVIL DRAWING "ACCESS RESTRICTION FENCE AND GATE DETAILS".
6. AD FENCE CAN BE USED IF AR FENCE IS PLACED ALONG THE RIGHT-OF-WAY OR THE HEIGHT OF THE WALL IS GREATER THAN 10 FEET. 15 FOOT MINIMUM REQUIRED TO THE FENCE WHEN AD FENCE IS PLACED ALONG THE RIGHT-OF-WAY.

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| CHECKED BY | A. ABTAHI |
| IN CHARGE | G. LUSHEROVICH |
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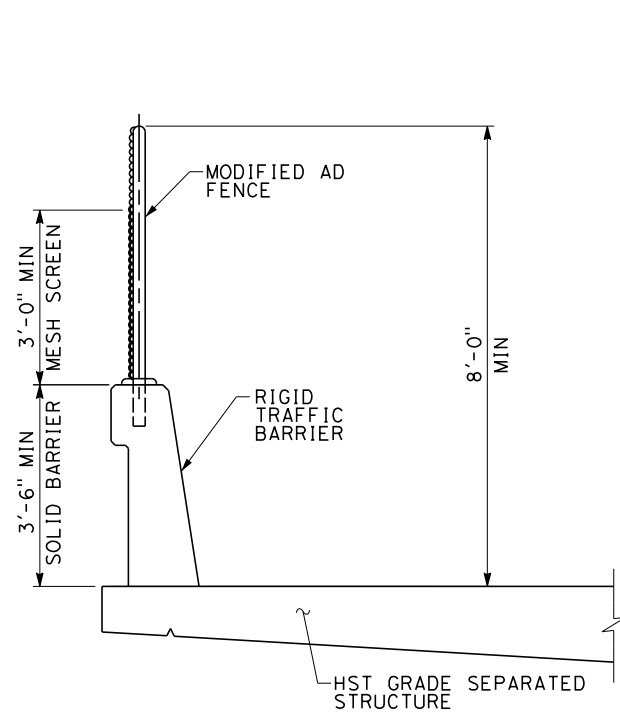


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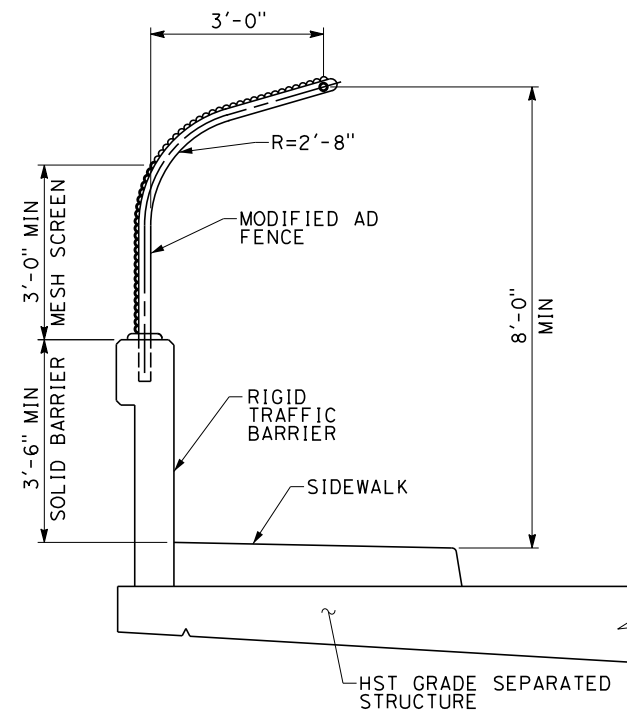
ACCESS RESTRICTION
FENCE AND GATE LOCATIONS

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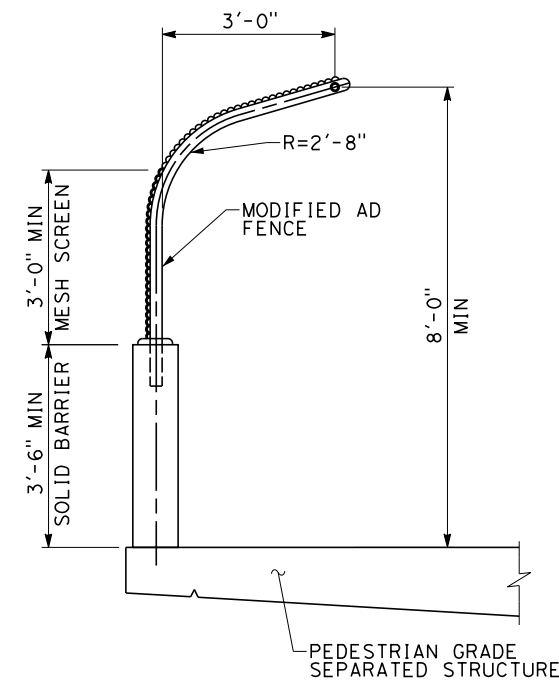
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CROSS SECTION
FENCE AT GRADE SEPARATED STRUCTURES
WITHOUT SIDEWALK



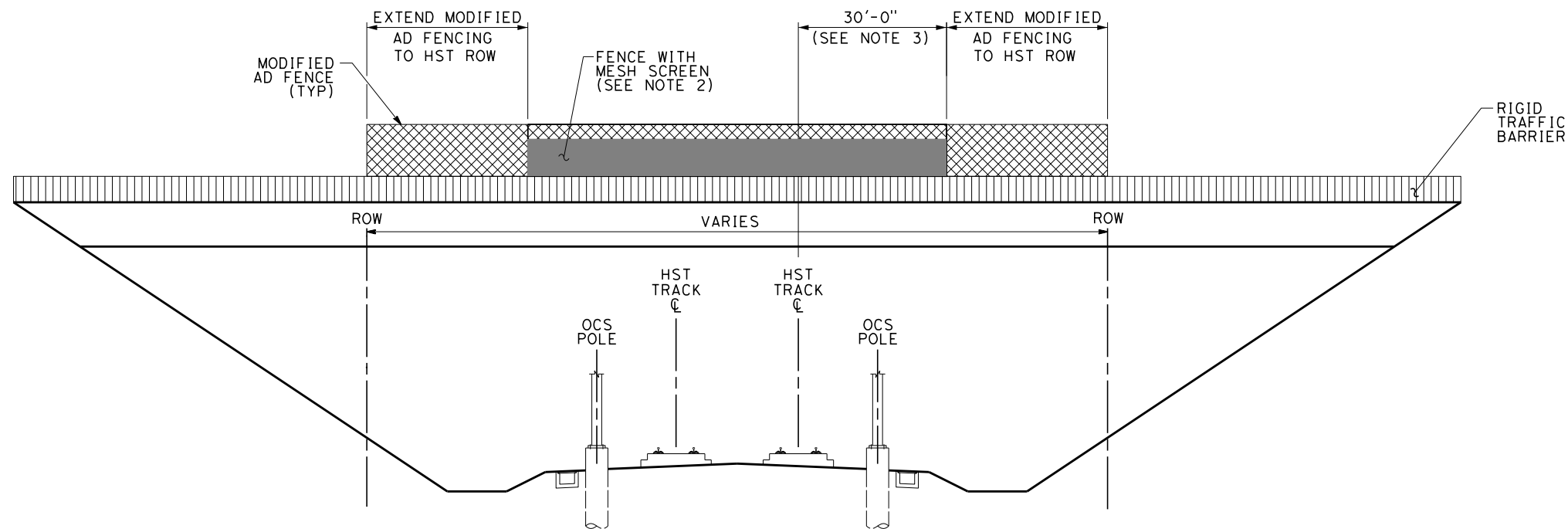
CROSS SECTION
FENCE AT GRADE SEPARATED STRUCTURES
WITH SIDEWALK



CROSS SECTION
FENCE AT PEDESTRIAN
GRADE SEPARATED STRUCTURE

NOTES:

1. TRACK, SYSTEMS, STRUCTURES AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. FOR MESH SCREEN REQUIREMENT, SEE OVERHEAD CONTACT SYSTEM AND TRACTION POWER RETURN SYSTEM CHAPTER OF THE DESIGN CRITERIA.
3. EXTEND MESH SCREEN 30 FEET FROM CENTERLINE OF OUTERMOST TRACK, OR 10 FEET BEYOND THE OUTERMOST ENERGIZED CONDUCTOR OR COMPONENT, WHICHEVER IS GREATER.



OVERHEAD STRUCTURE ELEVATION

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| DRAWN BY V. LAVERDE |
| CHECKED BY S. MILITELLO |
| IN CHARGE G. LUSHEROVICH |
| DATE 08/29/2014 |

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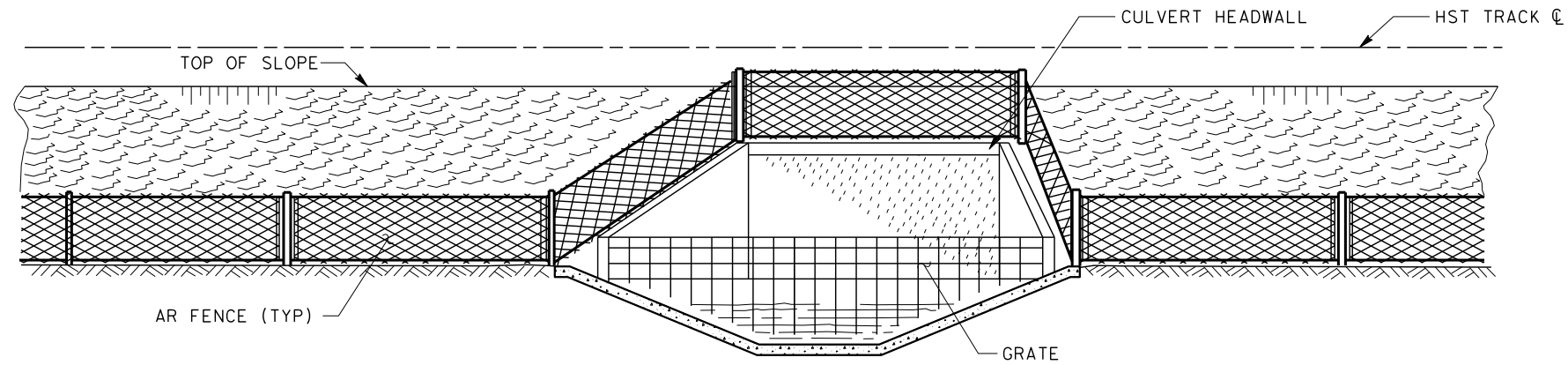
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HIGH-SPEED RAIL AUTHORITY

**CALIFORNIA HIGH-SPEED TRAIN PROJECT
CIVIL DIRECTIVE**

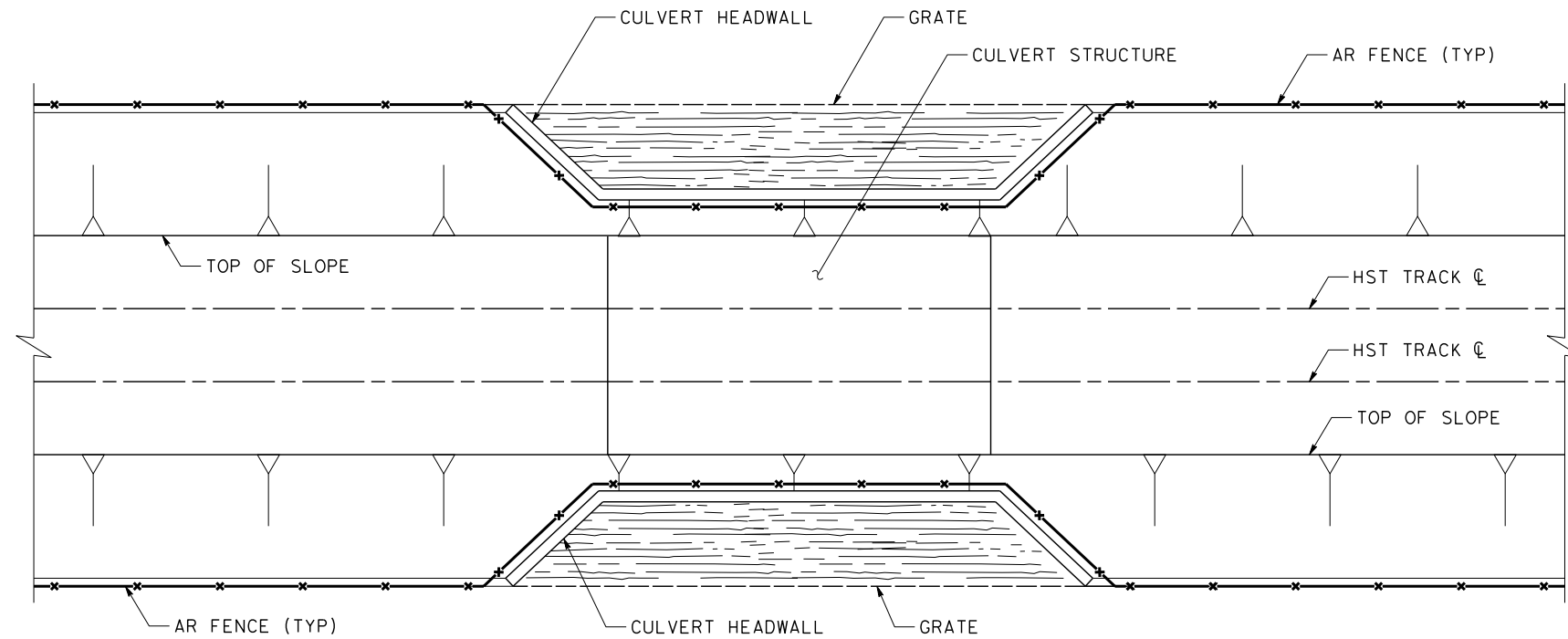
ACCESS DETERRING
FENCING ON GRADE SEPARATED STRUCTURES

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| SHEET NO. |

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ELEVATION



PLAN

NOTES:

- CULVERT STRUCTURE IS SCHEMATIC AND DOES NOT REPRESENT DESIGN.
- INSTALL GRATE IN THE CULVERT IF REQUIRED BY THREAT AND VULNERABILITY ANALYSIS, USING THE FOLLOWING CRITERIA:
 - GRATES SHALL BE INSTALLED UPSTREAM AND DOWNSTREAM OF CULVERT HEADWALLS.
 - GRATES SHALL HAVE BARS SPACED 6 INCHES APART AND SHALL BE DESIGNED TO WITHSTAND MAXIMUM IMPACT FROM LARGEST EXPECTED FLOATING DEBRIS.
 - THE MAXIMUM DISTANCE FROM THE BOTTOM OF THE GRATE TO THE BOTTOM AND SIDE SLOPES OF THE WATERWAY CROSSING SHALL BE 6 INCHES.
 - THE MINIMUM HEIGHT OF THE GRATES SHALL BE SUCH THAT IT RESTRICTS ACCESS DURING ALL CONDITIONS (DRY, HIGH WATER, ETC).
 - GRATE INSTALLATIONS SHALL BE COORDINATED WITH THE HYDRAULIC ENGINEER TO ENSURE PRESERVATION OF THE CULVERT FLOW CAPACITY.
- INSTALLATION OF GRATES IN DESIGNATED WILDLIFE CORRIDORS ARE SUBJECT TO APPROVAL BY THE APPROPRIATE REGULATORY AGENCY.

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| DESIGNED BY S. MILITELLO |
| DRAWN BY V. HUANTE |
| CHECKED BY A. ABTAHI |
| IN CHARGE G. LUSHEROVICH |
| DATE 01/24/2014 |

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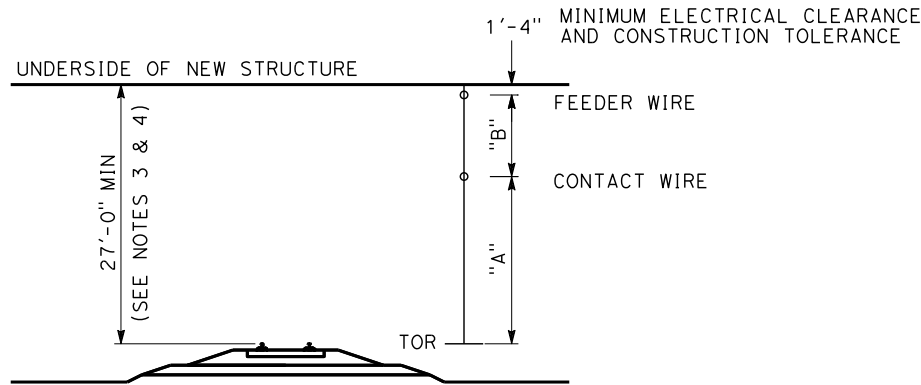
CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
CIVIL DIRECTIVE

FENCE AT CULVERT CROSSINGS

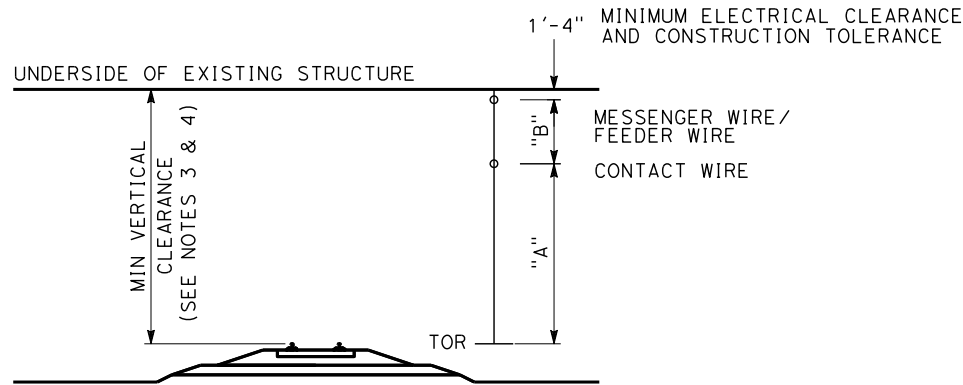
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NEW STRUCTURE OVER HST TRACKS

| | HEIGHT "A" | HEIGHT "B" | MIN VERTICAL CLEARANCE |
|---------------------|------------|------------|------------------------|
| DEDICATED HST TRACK | 17'-5" | 8'-3" | 27'-0" |
| SHARED USE TRACK | 18'-9" | 6'-11" | 27'-0" |

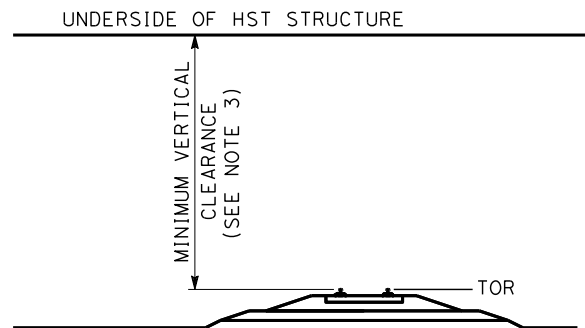


EXISTING STRUCTURE OVER HST TRACKS

| | HEIGHT "A" | HEIGHT "B" | MIN VERTICAL CLEARANCE |
|-----------------------------------|------------|------------|------------------------|
| DEDICATED HST TRACK | 17'-5" | 8'-3" | 27'-0" |
| DEDICATED HST TRACK (V ≤ 125 MPH) | 17'-5" | 5'-3" | 24'-0"* |
| SHARED USE TRACK | 18'-9" | 4'-0" | 24'-6"** |

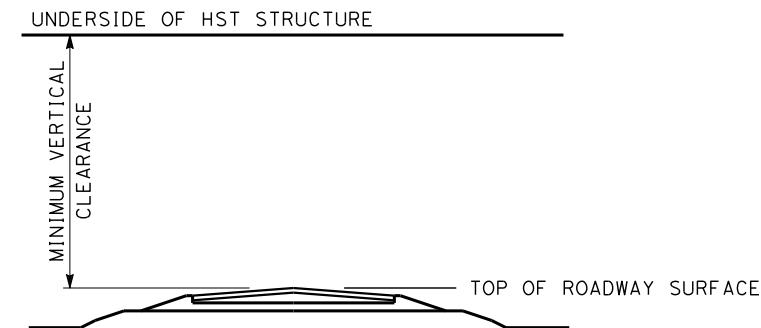
* SEE NOTE 4

** PER CALTRAIN



NEW HST STRUCTURE OVER TRACK

| | MIN VERTICAL CLEARANCE |
|---------------------------|------------------------|
| <u>FREIGHT TRACKS</u> | |
| BNSF | 23'-4" |
| UPRR | 23'-0" |
| <u>NON-FREIGHT TRACKS</u> | |
| METROLINK | 24'-0" |
| CALTRAIN | 24'-6" |



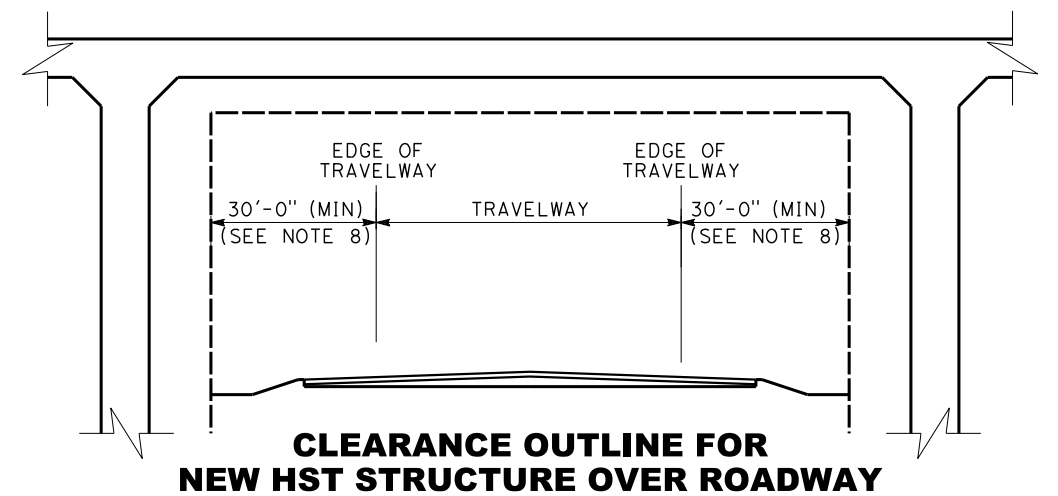
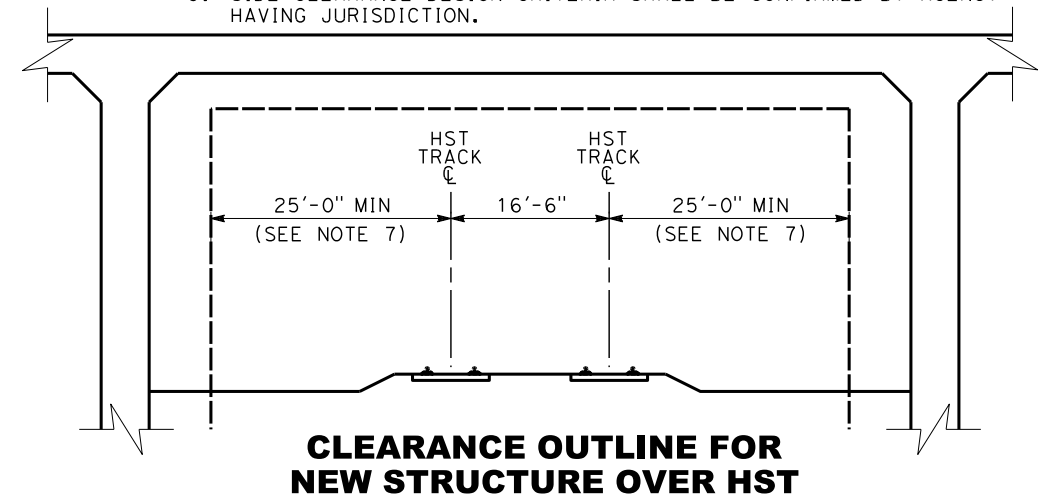
NEW HST STRUCTURE OVER ROADWAY

| | MIN VERTICAL CLEARANCE |
|--------------------------------|------------------------|
| FREEWAY/EXPRESSWAY | 16'-6" |
| LOCAL ROADWAY | 15'-0" * |
| EXTRA LEGAL LOAD NETWORK(ELLN) | 20'-3" |

* SEE NOTE 6

NOTES:

1. TOLERANCES ARE NOT ADDITIVE FOR INCREMENTAL DISTANCES.
2. HST TRACKFORM IS SCHEMATIC AND DOES NOT REPRESENT THE DESIGN.
3. AT LOCATIONS WHERE SUPERELEVATION IS PRESENT, VERTICAL CLEARANCES SHALL BE MEASURED FROM THE HIGH RAIL.
4. DEFINED CLEARANCES ASSUMES GRADE SEPARATED STRUCTURE LENGTH ALONG TRACK IS NO MORE THAN 160 FEET FOR HST TRACK OVER 125 MPH. THE OCS SHALL BE FREE RUNNING UNDER GRADE SEPARATED STRUCTURES WITH NO SUPPORTS. STRUCTURES WIDER THAN 160 FEET REQUIRE FURTHER APPROVAL.
5. PROTECTIVE PANEL IS REQUIRED FOR VERTICAL CLEARANCES LESS THAN THE PANTOGRAPH ZONE HEIGHT (26 FEET - 3 INCHES) FOR STRUCTURES OVER HST TRACKS.
6. FOR LOCAL ROADWAYS, 15 FEET MINIMUM VERTICAL CLEARANCE SHALL BE CONFIRMED BY AGENCY HAVING JURISDICTION.
7. PROTECTIVE STRUCTURE IS REQUIRED IF SIDE CLEARANCE IS LESS THAN 25 FEET. SEE THE AREMA MANUAL FOR RAILWAY ENGINEERING FOR PIER PROTECTION REQUIREMENTS.
8. PROTECTIVE TRAFFIC BARRIER REQUIREMENTS SHALL BE CONFIRMED BY AGENCY HAVING JURISDICTION.
9. SIDE CLEARANCE DESIGN CRITERIA SHALL BE CONFIRMED BY AGENCY HAVING JURISDICTION.



| | MIN SIDE CLEARANCE |
|--------------------|--------------------|
| FREEWAY/EXPRESSWAY | 30'-0" |
| OTHER | SEE NOTE 9 |

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| DESIGNED BY S. MILITELLO |
| DRAWN BY V. HUANTE |
| CHECKED BY H. NGUYEN |
| IN CHARGE G. LUSHEROVICH |
| DATE 01/24/2014 |

**PARSONS
BRINCKERHOFF**



CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

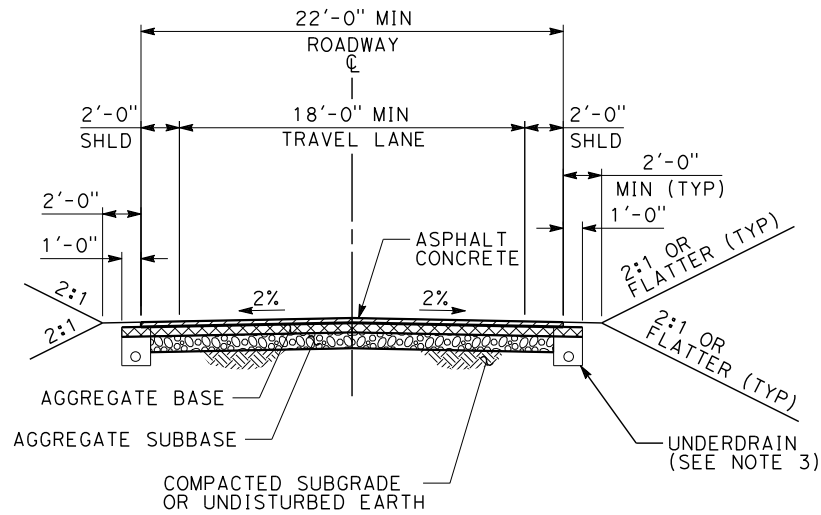
CALIFORNIA HIGH-SPEED TRAIN PROJECT CIVIL DIRECTIVE

MINIMUM CLEARANCE
GRADE SEPARATED STRUCTURES

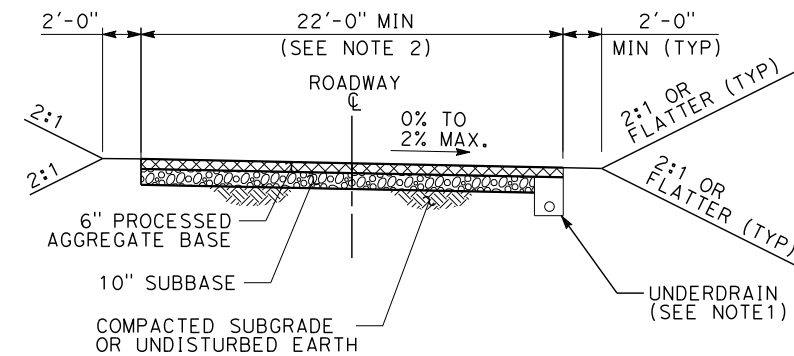
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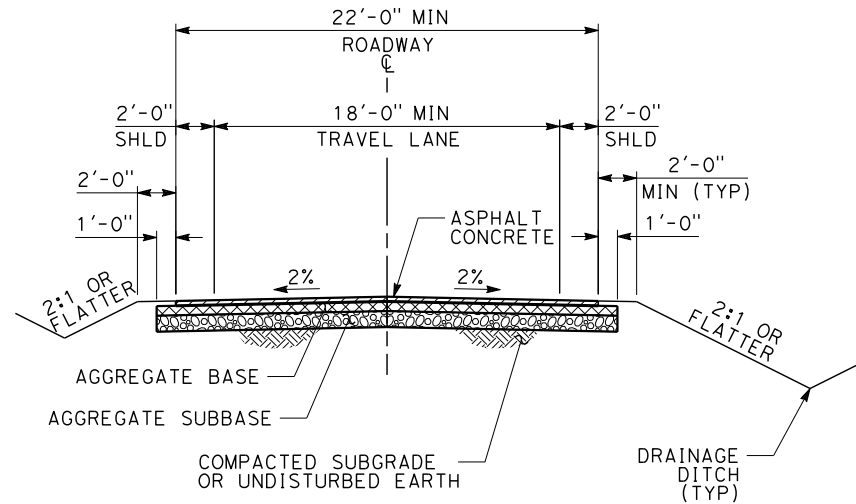
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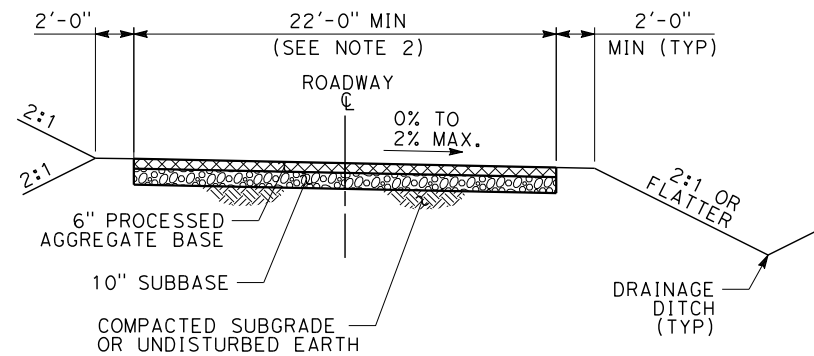
**TYPICAL 22 FT ROADWAY
SECTION-PAVED
CLOSED DRAINAGE**



**TYPICAL 22 FT ROADWAY
SECTION-UNPAVED
CLOSED DRAINAGE**



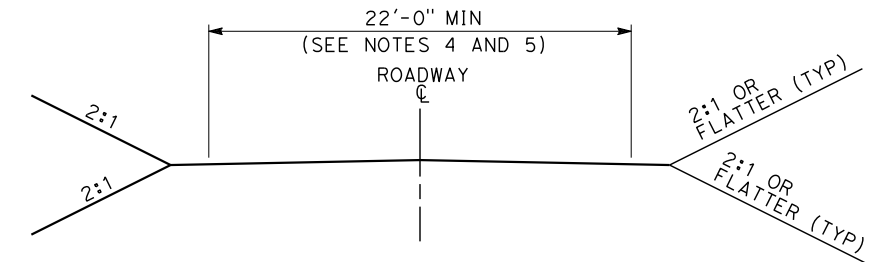
**TYPICAL 22 FT ROADWAY
SECTION-PAVED
OPEN DRAINAGE**



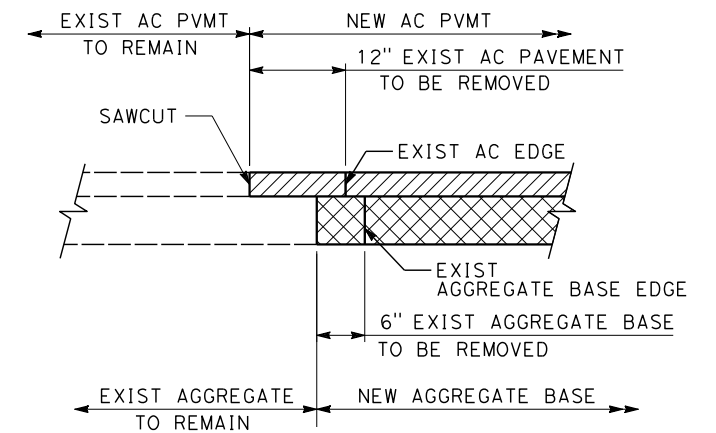
**TYPICAL 22 FT ROADWAY
SECTION-UNPAVED
OPEN DRAINAGE**

NOTES:

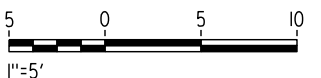
1. AUTHORITY ROADWAYS ARE REFERRED TO AS ACCESS ROADS AND SERVICE ROADS.
2. UNPAVED ROADWAYS CAN BE USED AS TEMPORARY ACCESS TO SITES.
3. REFER TO CALTRANS STANDARD PLANS FOR:
A) CURBS AND DRIVEWAYS (A87A)
B) UNDERDRAINS (D102)
4. IF FIRE HYDRANT IS LOCATED ON ROAD, MINIMUM ROADWAY WIDTH SHALL BE 26 FEET.
5. TWO-WAY SERVICE ROADS SHALL BE 24 FEET WIDE WITH NO SHOULDERS.
6. COMPACT SUBGRADE TO 95% COMPACTION.



AUTHORITY ROADWAYS WIDTH



PAVEMENT CONNECTION DETAIL
SCALE: 1"=1'-0"



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| DESIGNED BY S. MILITELLO |
| DRAWN BY V. HUANTE |
| CHECKED BY A. ABTAHI |
| IN CHARGE G. LUSHEROVICH |
| DATE 01/24/2014 |

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**CALIFORNIA HIGH-SPEED TRAIN PROJECT
CIVIL DIRECTIVE**

AUTHORITY ROADWAYS

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| CONTRACT NO. |
| DRAWING NO. DD-CV-905 |
| SCALE AS SHOWN |
| SHEET NO. |

California High-Speed Rail Authority



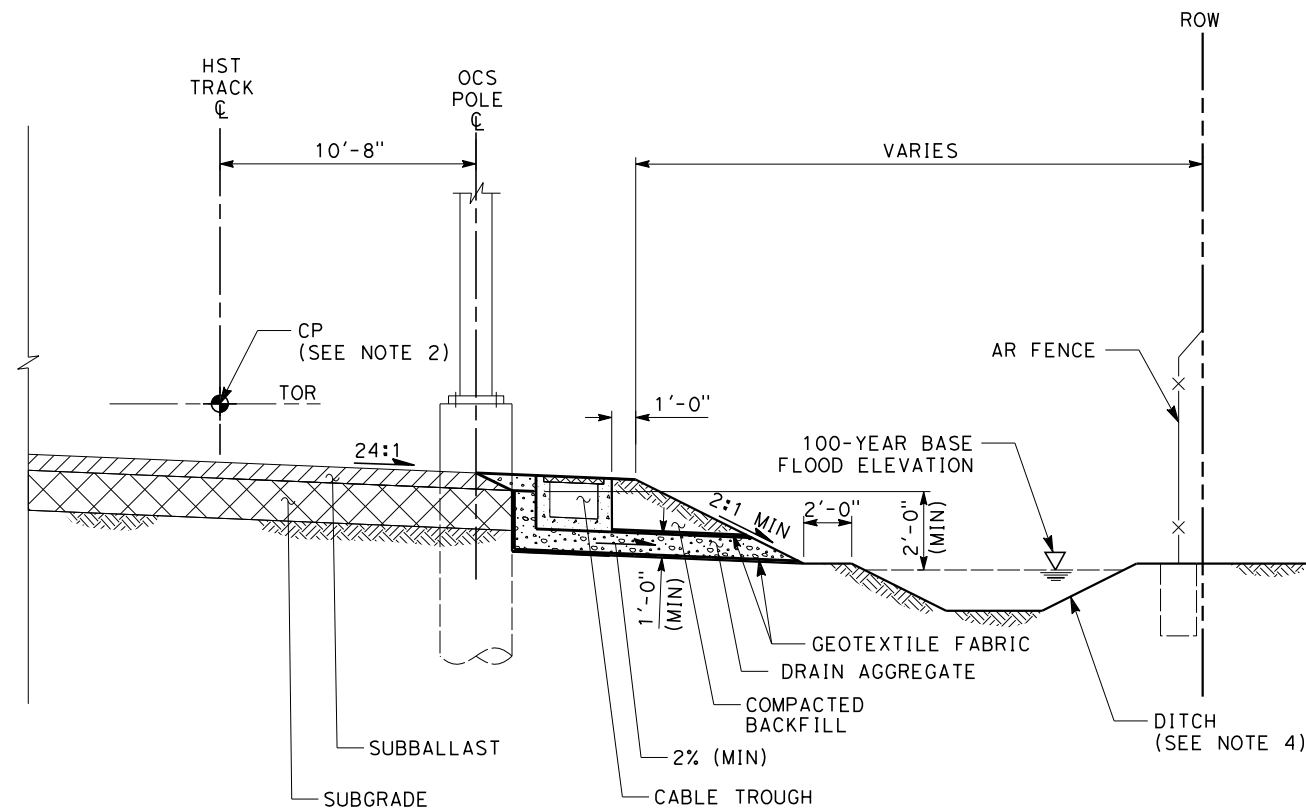
RFP No.: HSR 13-57

**Request for Proposals for Design-Build
Services for Construction Package 2-3**

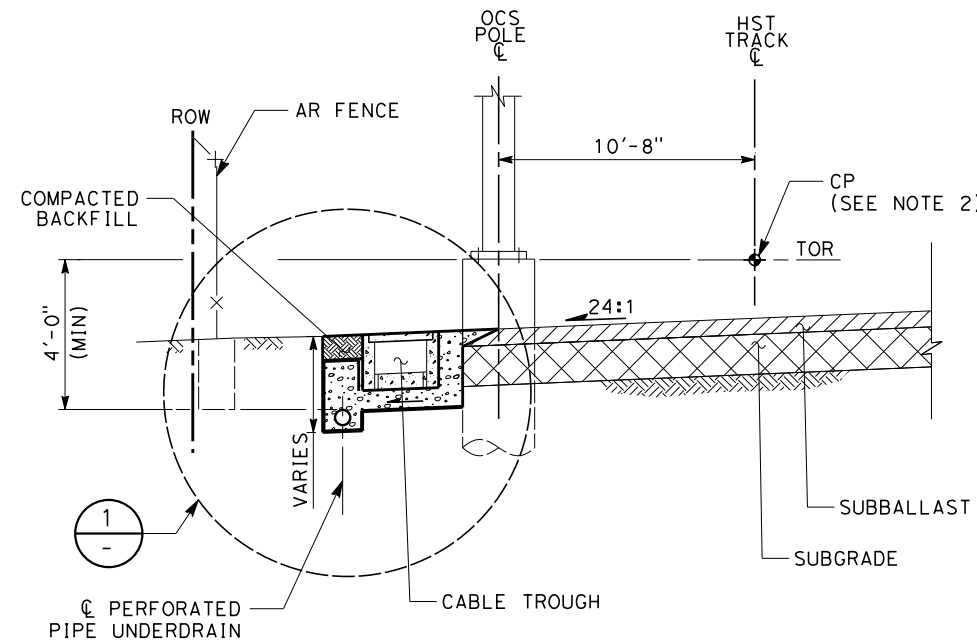
**Book III, Part B.1
Directive Drawings**

Drainage

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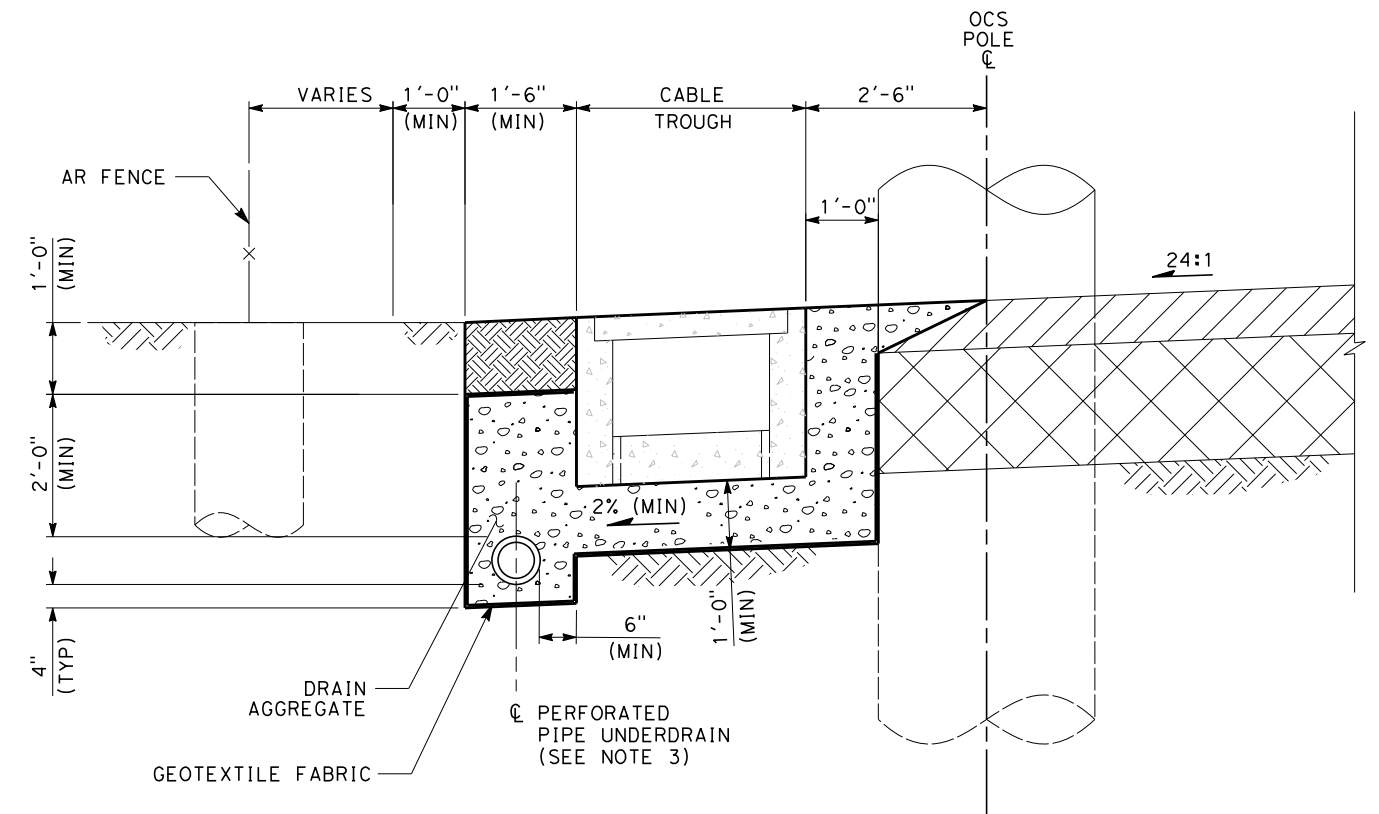
TYPICAL SECTION
AT GRADE TRACK OPEN DRAINAGE SYSTEM



TYPICAL SECTION
AT GRADE TRACK CLOSED DRAINAGE SYSTEM

NOTES:

1. TRACK AND SYSTEMS ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. THE CONTROL POINT (CP) IS THE INTERSECTION OF THE CENTERLINE OF TRACK AND THE TOP OF THE RAIL, FOR SUPERELEVATED TRACK SECTIONS THE CP IS THE INTERSECTION OF THE CENTERLINE OF THE TRACK AND THE TOP OF THE LOW RAIL.
3. TRACK DRAINAGE SYSTEM SHALL BE CONNECTED AND DISCHARGE TO THE LOCAL STORM DRAIN SYSTEM.
4. DITCH SHALL CONFORM TO THE FOLLOWING REQUIREMENTS:
DEPTH OF DITCH = 1' MINIMUM
SIDE SLOPE = 2:1 MAXIMUM FOR CONCRETE LINED DITCH AND 3:1 MAXIMUM FOR GRASS LINED DITCH
WIDTH OF FLAT BOTTOM = 4' MINIMUM



DETAIL
NO SCALE

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| DESIGNED BY K. SISTLA |
| DRAWN BY V. HUANTE |
| CHECKED BY A. ABTAHI |
| IN CHARGE G. LUSHEROVICH |
| DATE 05/09/2014 |

**PARSONS
BRINCKERHOFF**



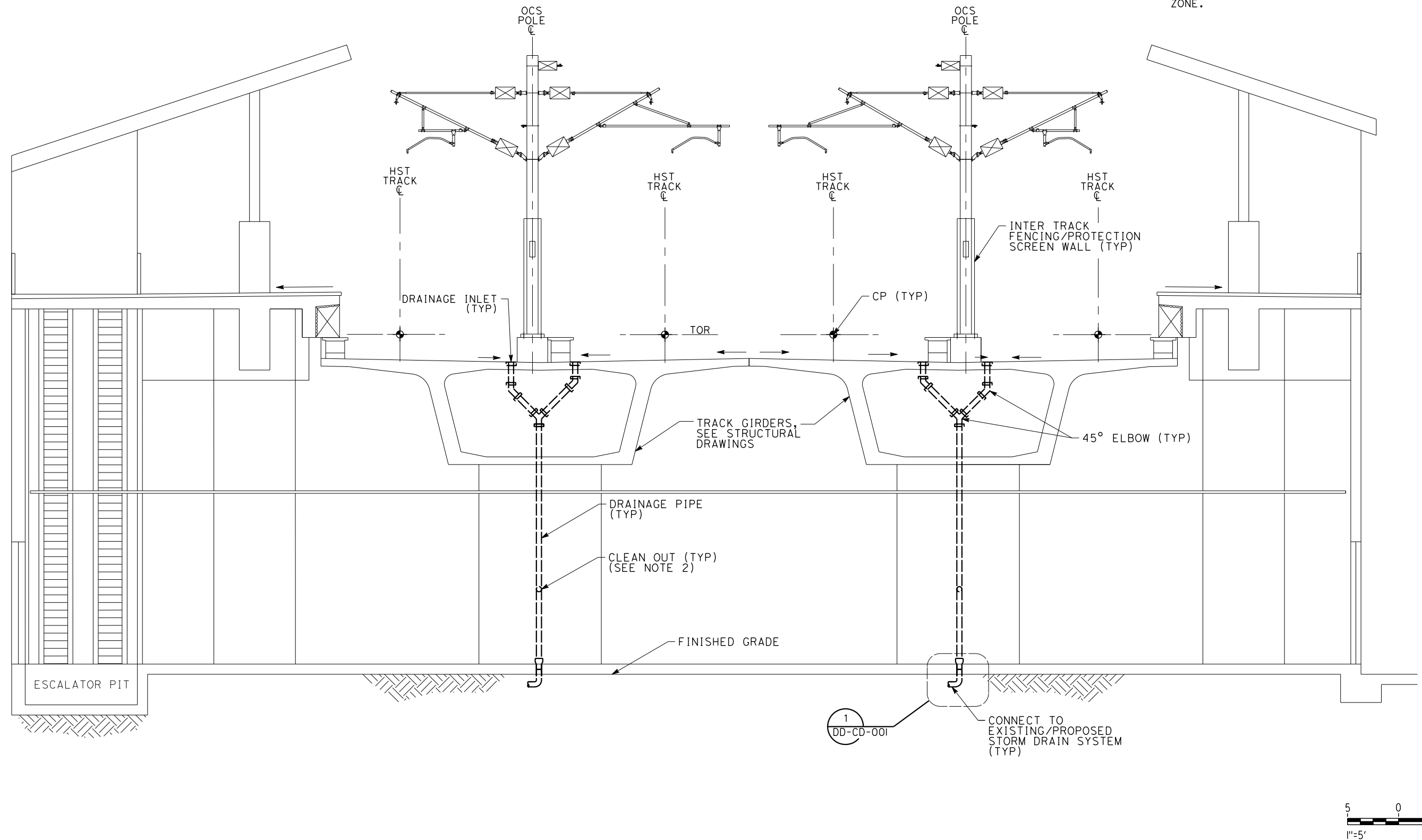
CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

**CALIFORNIA HIGH-SPEED TRAIN PROJECT
DRAINAGE DIRECTIVE**

AT-GRADE TRACK
DRAINAGE SYSTEM

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| CONTRACT NO. |
| DRAWING NO. DD-CD-003 |
| SCALE NO SCALE |
| SHEET NO. |

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NOTES:

1. TRACK, SYSTEMS AND STRUCTURES ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. CLEANOUTS AND PIPE PENETRATIONS FROM THE COLUMNS SHALL BE OUTSIDE OF THE PLASTIC HINGE ZONE.

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| DESIGNED BY K. SISTLA |
| DRAWN BY V. HUANTE |
| CHECKED BY A. ABTAHI |
| IN CHARGE G. LUSHEROVICH |
| DATE 01/24/2014 |

**PARSONS
BRINCKERHOFF**



CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

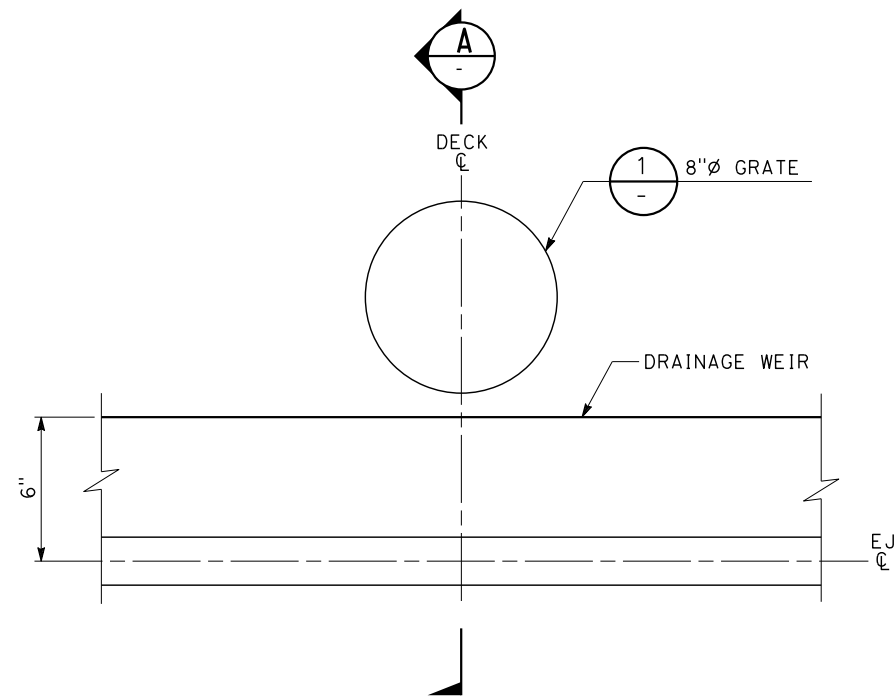
**CALIFORNIA HIGH-SPEED TRAIN PROJECT
DRAINAGE DIRECTIVE**

ELEVATED STATION PLATFORM
DRAINAGE SYSTEM

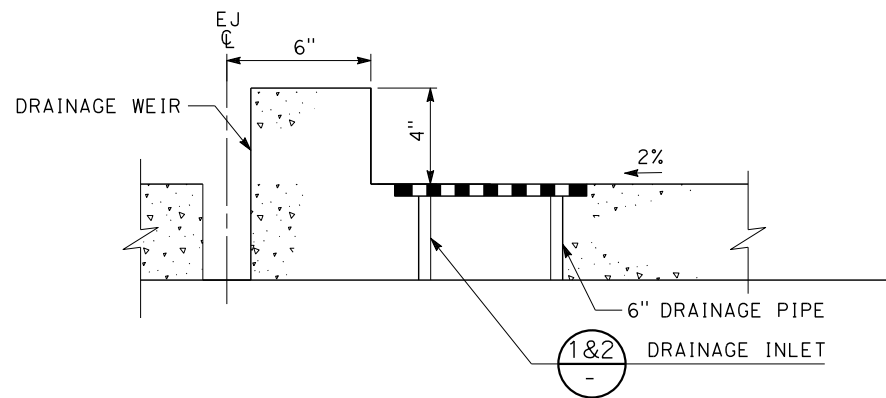
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| CONTRACT NO. |
| DRAWING NO. DD-CD-010 |
| SCALE AS SHOWN |
| SHEET NO. |

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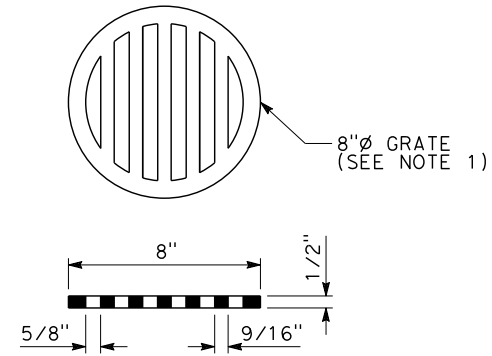
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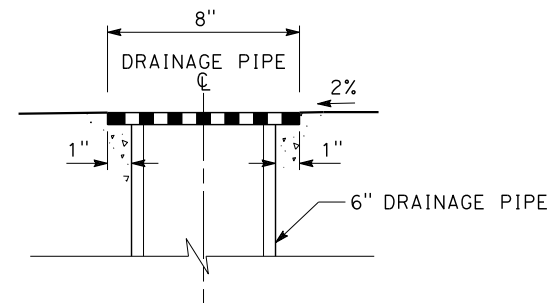
PLAN
DRAINAGE INLET ON AERIAL STRUCTURE DECK



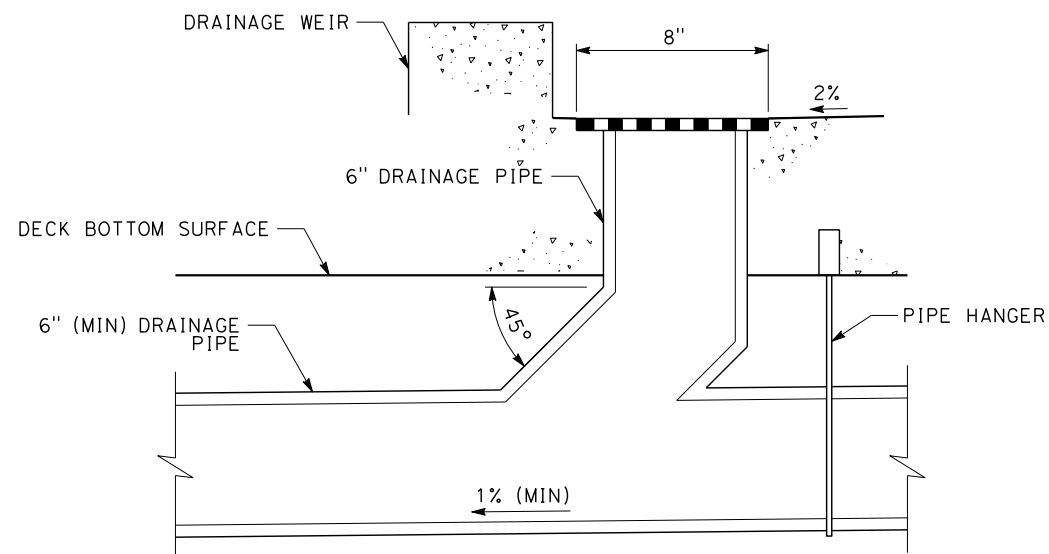
SECTION
A



DETAIL
1



DETAIL
VERTICAL INLET 2



DETAIL
45° ANGLE INLET 3

NOTES:

1. DRAIN GRATES SHALL BE SECURELY CONNECTED TO THE INLET.

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| DESIGNED BY K. SISTLA |
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| IN CHARGE G. LUSHEROVICH |
| DATE 01/24/2014 |

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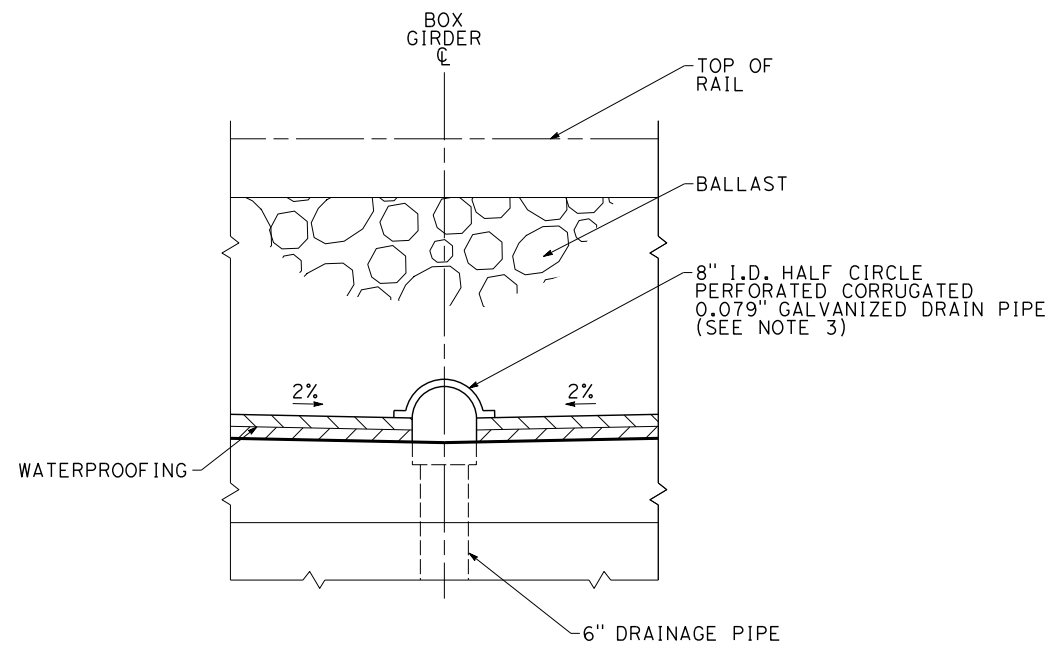
CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

**CALIFORNIA HIGH-SPEED TRAIN PROJECT
DRAINAGE DIRECTIVE**

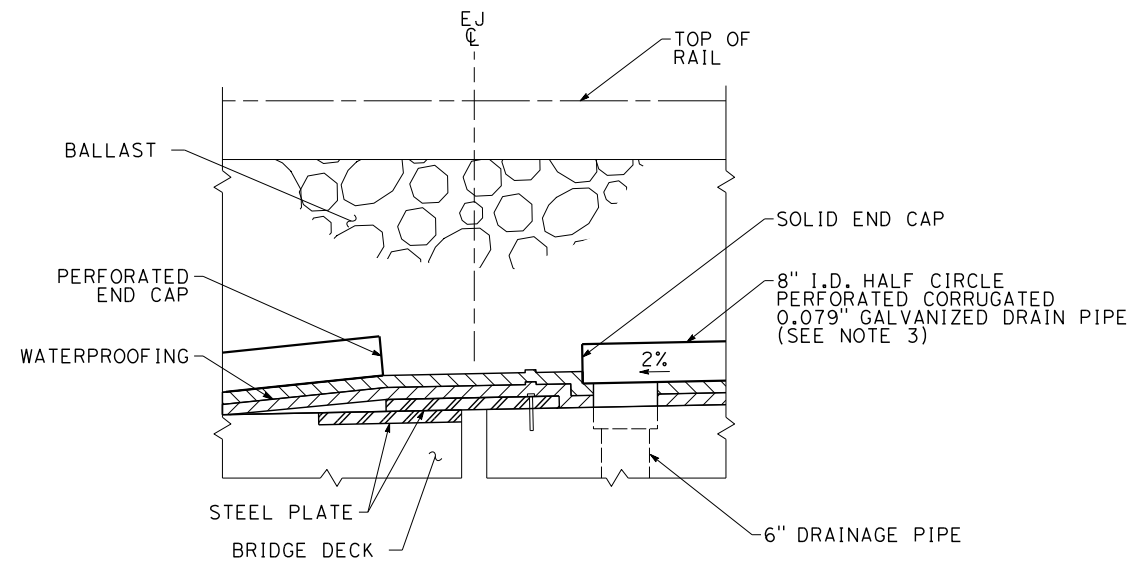
NON-BALLASTED AERIAL STRUCTURE BRIDGE DECK
DRAINAGE INLET DETAIL

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| CONTRACT NO. |
| DRAWING NO. DD-CD-900 |
| SCALE NO SCALE |
| SHEET NO. |

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1 DRAIN DETAIL
ON CONCRETE DECK



2 EXPANSION JOINT DETAIL
ON BALLASTED AERIAL STRUCTURE

NOTES:

1. TRACK, SYSTEMS AND STRUCTURES ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. FOR DRAINAGE SYSTEM DETAILS SEE DD-CD-001.
3. THE 8" HALF CIRCLE PERFORATED PIPE SHALL BE INSTALLED ALONG THE ENTIRE INVERTED CROWN OF THE BRIDGE DECK, EXCEPT AT THE EXPANSION JOINT.

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| DESIGNED BY A. ABTAHI |
| DRAWN BY V. HUANTE |
| CHECKED BY H. NGUYEN |
| IN CHARGE G. LUSHEROVICH |
| DATE 01/24/2014 |

**PARSONS
BRINCKERHOFF**



CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

**CALIFORNIA HIGH-SPEED TRAIN PROJECT
DRAINAGE DIRECTIVE**

BALLASTED AERIAL STRUCTURE
DECK DRAINAGE SYSTEM DETAILS

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| CONTRACT NO. 13259 |
| DRAWING NO. DD-CD-901 |
| SCALE NO SCALE |
| SHEET NO. |

California High-Speed Rail Authority



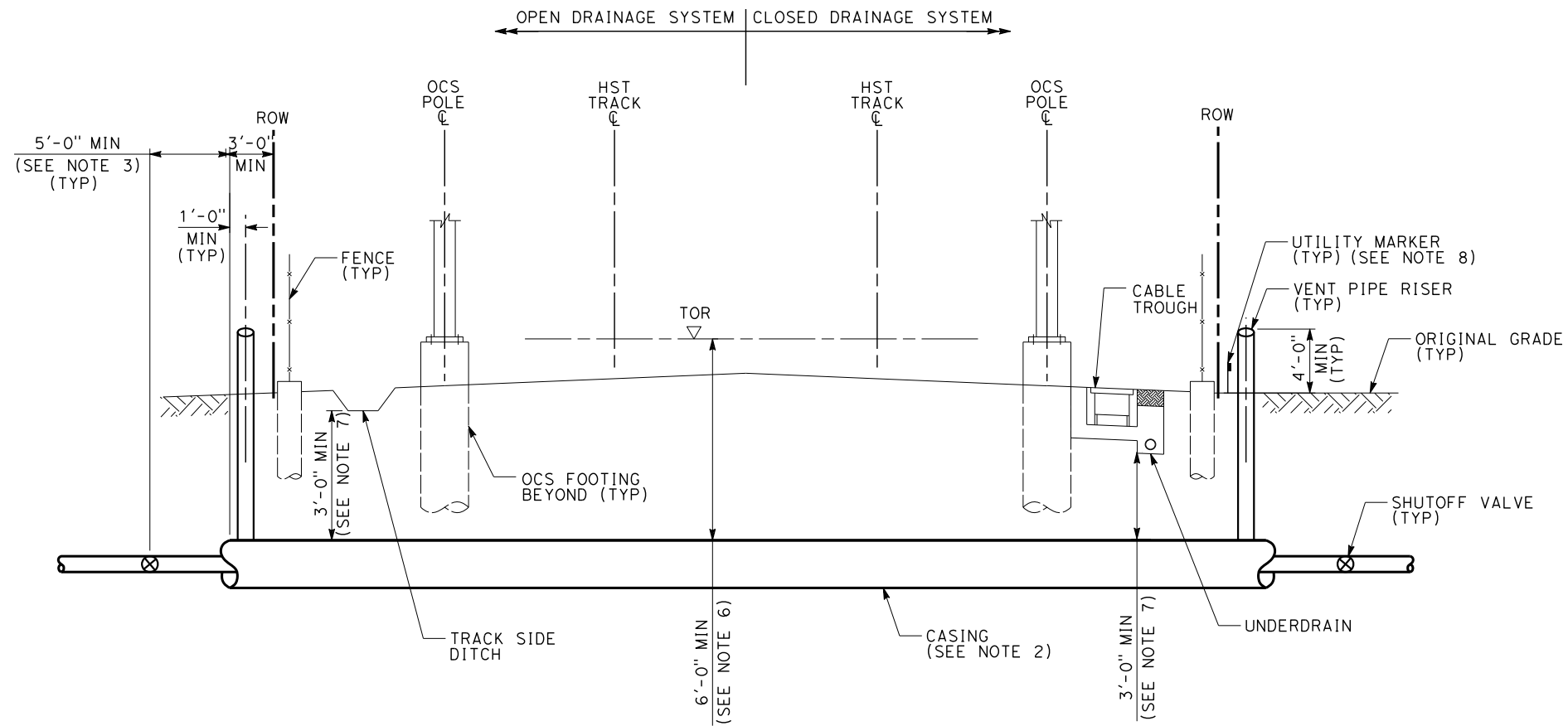
RFP No.: HSR 13-57

**Request for Proposals for Design-Build
Services for Construction Package 2-3**

**Book III, Part B.1
Directive Drawings**

Utility

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- NOTES:**
1. TRACK, SYSTEMS, DRAINAGE, AND STRUCTURES ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
 2. FOR ADDITIONAL REQUIREMENTS, SEE AREMA MANUAL.
 3. SHUTOFF VALVE MUST BE ACCESSIBLE FROM OUTSIDE THE RIGHT OF WAY. IT MAY NOT BE REQUIRED ON BOTH SIDES.
 4. THE CASING SHALL CONTINUE 3'-0" BEYOND THE RIGHT OF WAY.
 5. TRANSVERSE UTILITIES SHALL BE LOCATED AWAY FROM MANHOLES, OCS FOOTINGS, AND OTHER HST SUBSURFACE ELEMENTS.
 6. MINIMUM CLEARANCE FOR GAS TRANSMISSION PIPELINE CROSSING SHALL BE 10'-6" BELOW TOP OF RAIL.
 7. MINIMUM CLEARANCE FOR UNDERGROUND WIRE LINE CROSSING, OVER 750 VOLTS, SHALL BE 4'-0" AND FOR GAS TRANSMISSION PIPELINE CROSSING SHALL BE 6'-0" BELOW DRAINAGE FACILITIES.
 8. UTILITY MARKER TO INDICATE LOCATION OF UTILITY CROSSING AT RIGHT-OF-WAY.

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| DESIGNED BY A. ABTAHI |
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| CHECKED BY H. NGUYEN |
| IN CHARGE G. LUSHEROVICH |
| DATE 01/24/2014 |

**PARSONS
BRINCKERHOFF**



CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

**CALIFORNIA HIGH-SPEED TRAIN PROJECT
UTILITIES DIRECTIVE**

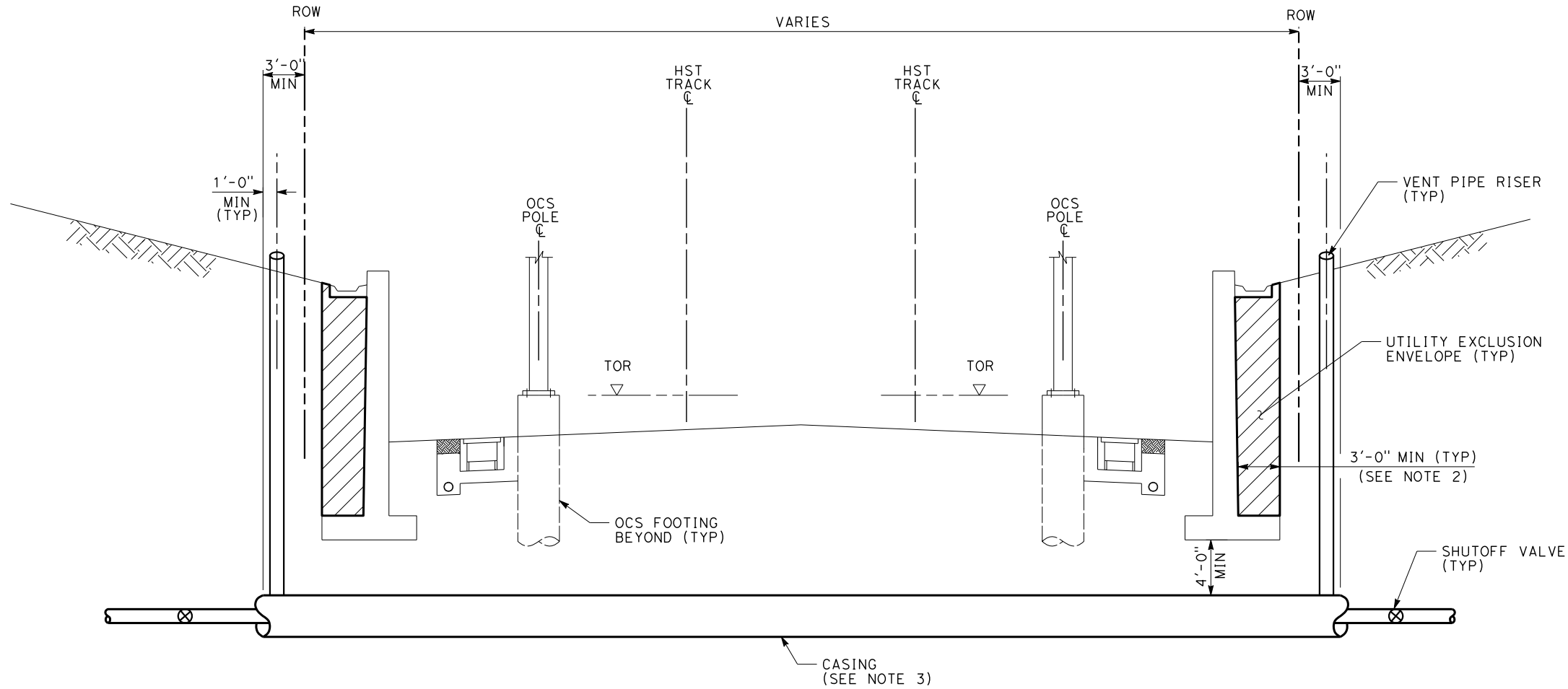
UTILITY CROSSING CLEARANCES
AT GRADE

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NOTES:

1. TRACK, SYSTEMS, DRAINAGE, AND STRUCTURES ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. NO UTILITIES ABOVE THE WALL FOOTINGS.
3. FOR ADDITIONAL REQUIREMENTS, SEE AREMA MANUAL.
4. TRANSVERSE UTILITIES SHALL BE LOCATED AWAY FROM MANHOLES, OCS FOOTINGS, AND OTHER HST SUBSURFACE ELEMENTS.



04/02/2014 - RFP No.: HSR 13-57

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| CHECKED BY H. NGUYEN |
| IN CHARGE G. LUSHEROVICH |
| DATE 01/24/2014 |

PARSONS
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CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
UTILITIES DIRECTIVE

UTILITIES CROSSING CLEARANCES
RETAINED CUT TRENCH

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^{VC} **California High-Speed Rail Authority**



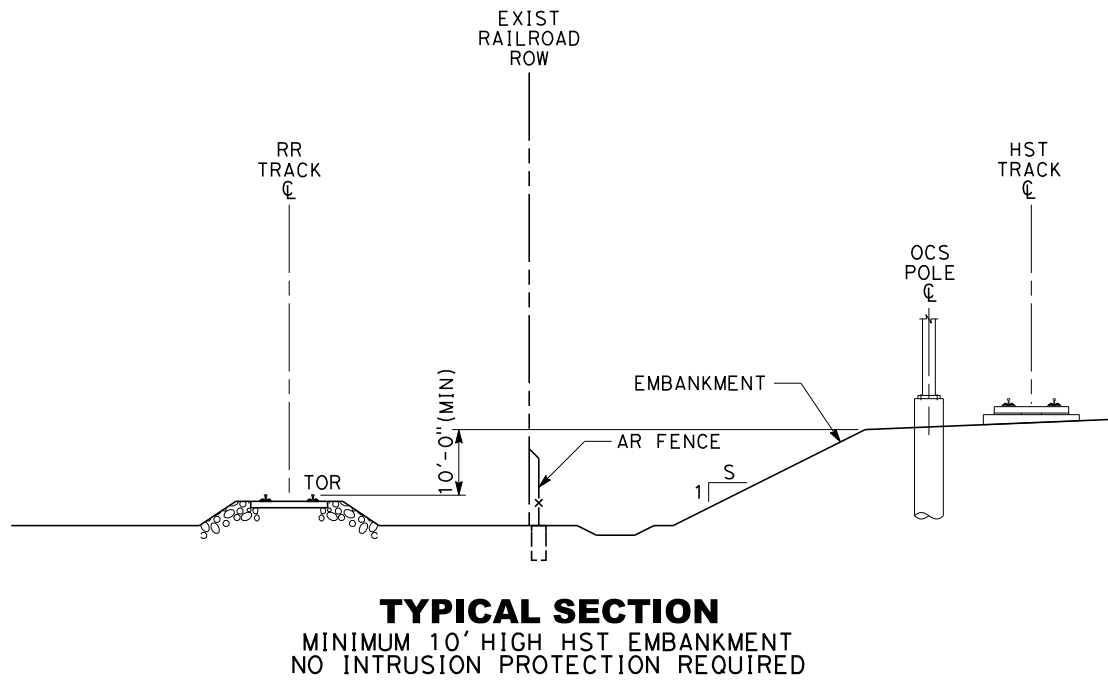
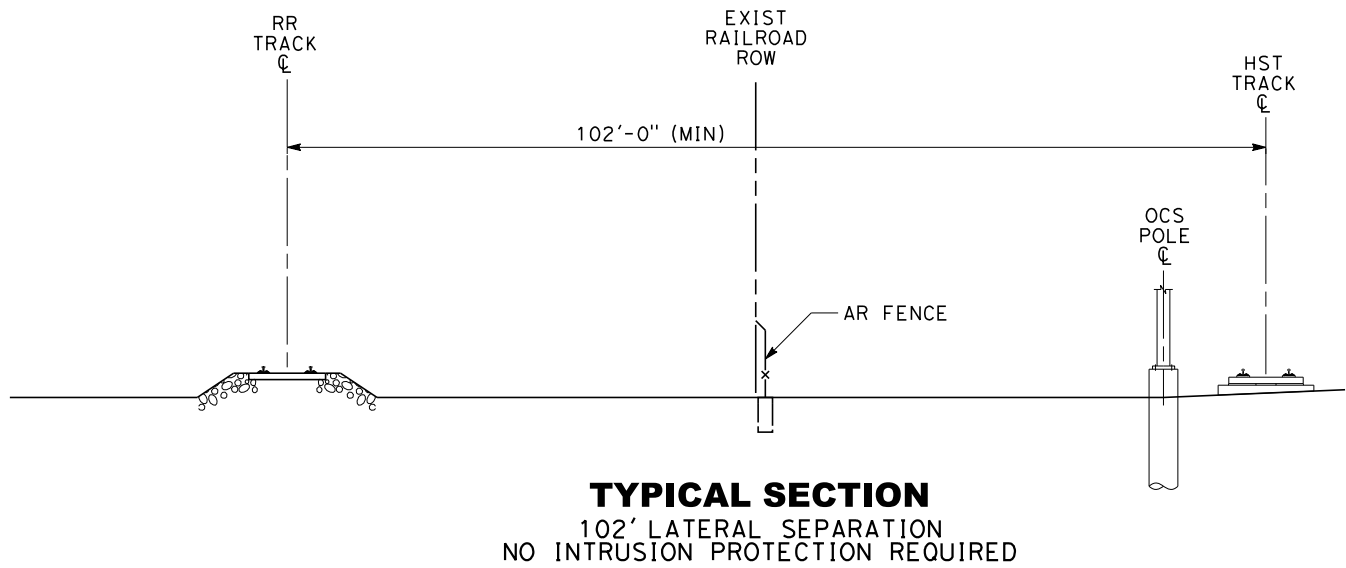
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**Request for Proposals for Design-Build
Services for Construction Package 2-3**

**Book II, Part B.1
Directive Drawings**

Intrusion Protection

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NOTES:

1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. AR FENCE AND ITS FOUNDATION SHALL BE INSTALLED INSIDE AUTHORITY RIGHT-OF-WAY.
3. FOR COMMON EMBANKMENT FILL ONLY, USE 2:1 SIDE SLOPES.

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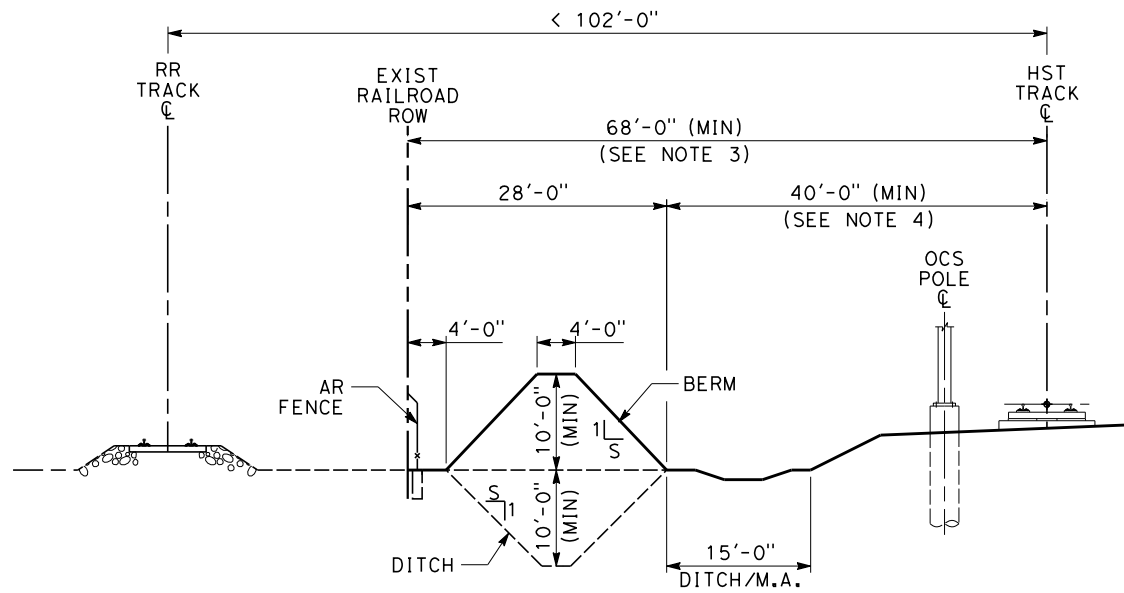
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| DESIGNED BY A. ABTAHI |
| DRAWN BY V. HUANTE |
| CHECKED BY H. NGUYEN |
| IN CHARGE G. LUSHEROVICH |
| DATE 05/09/2014 |



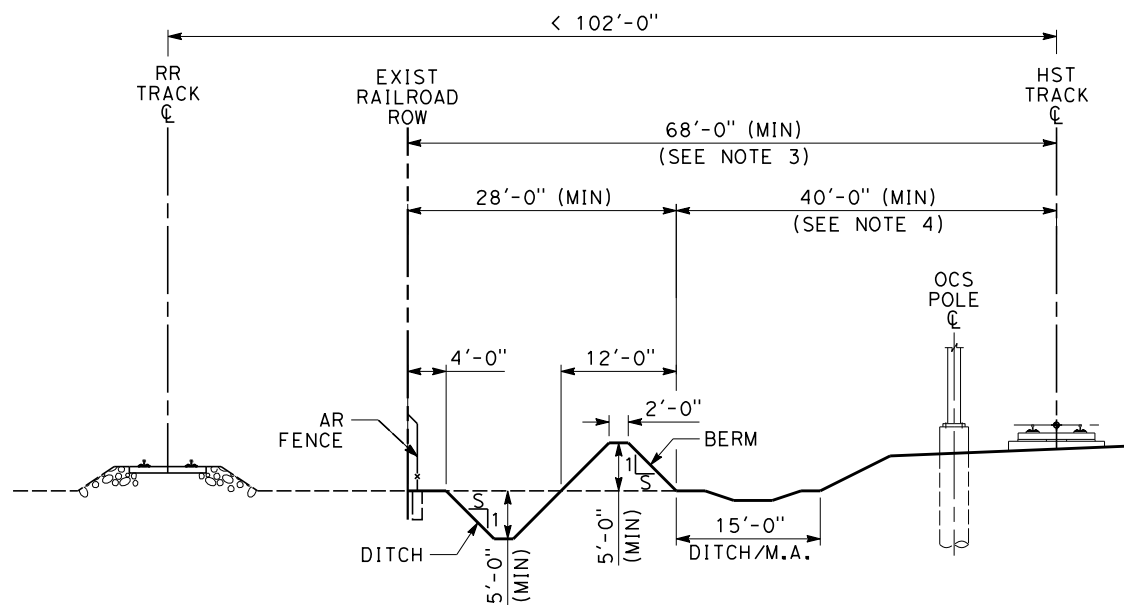
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| CALIFORNIA HIGH-SPEED TRAIN PROJECT INTRUSION PROTECTION DIRECTIVE |
| RAILROAD ADJACENT TO HST AT-GRADE WITHOUT INTRUSION PROTECTION |

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| SCALE NO SCALE |
| SHEET NO. |

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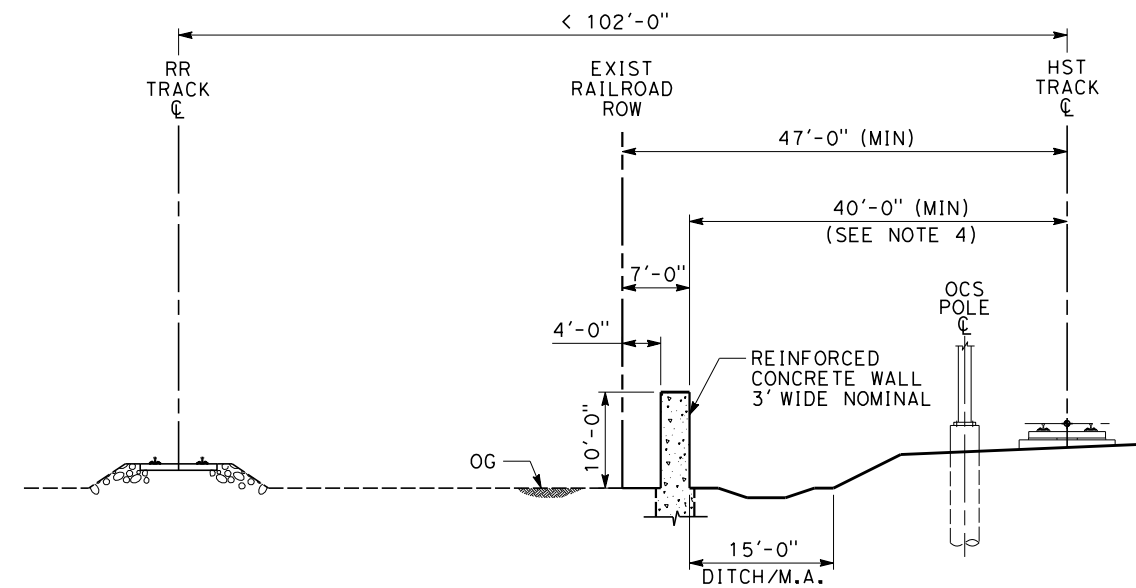
TYPICAL SECTION
EARTHEN BERM OR DITCH



TYPICAL SECTION
EARTHEN BERM AND DITCH

NOTES:

1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. SIDE SLOPES (S:1) DETERMINED THROUGH SLOPE STABILITY ANALYSIS. FOR COMMON EMBANKMENT FILL ONLY, USE 2:1 SIDE SLOPES.
3. MINIMUM DISTANCE IS BASED ON S=1.
4. MINIMUM DISTANCE CONSIDERS A MINIMUM OF 3'-6" HIGH EMBANKMENT, INCLUSIVE OF SUBBALLAST.
5. BERM MATERIAL AND COMPACTION SHALL BE SIMILAR TO EMBANKMENT.



TYPICAL SECTION
CONCRETE WALL BARRIER

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| DATE 05/09/2014 |

**PARSONS
BRINCKERHOFF**



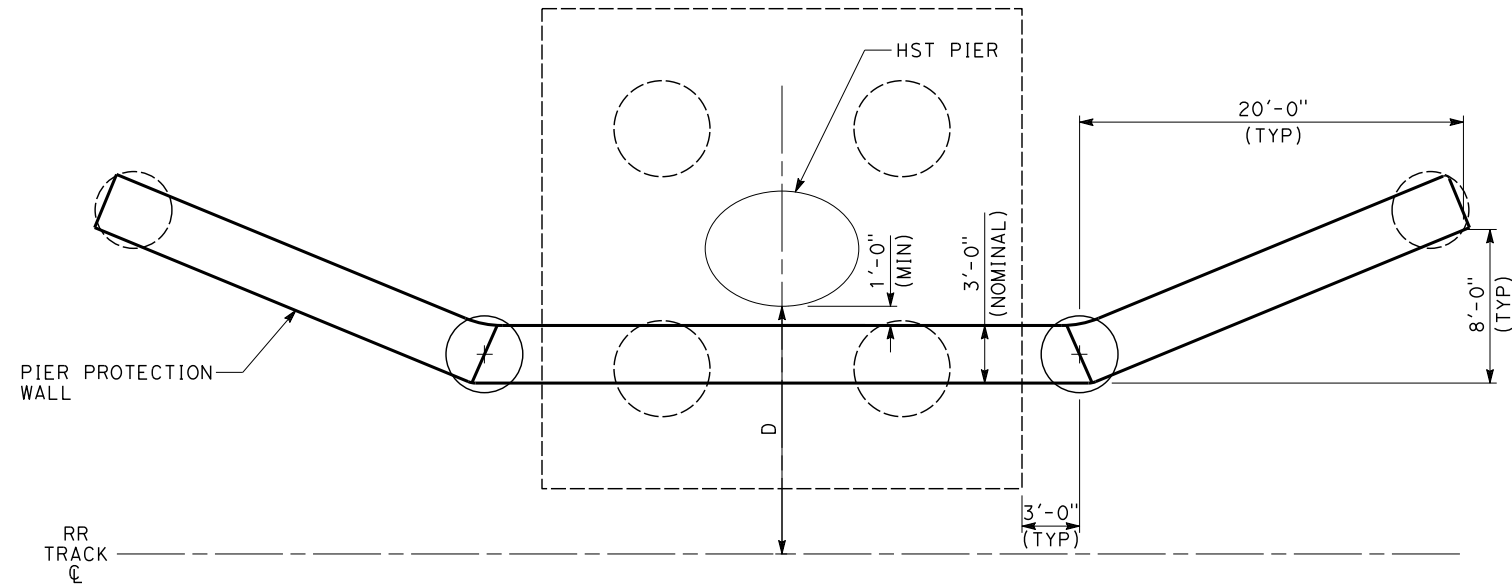
CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

**CALIFORNIA HIGH-SPEED TRAIN PROJECT
INTRUSION PROTECTION DIRECTIVE**

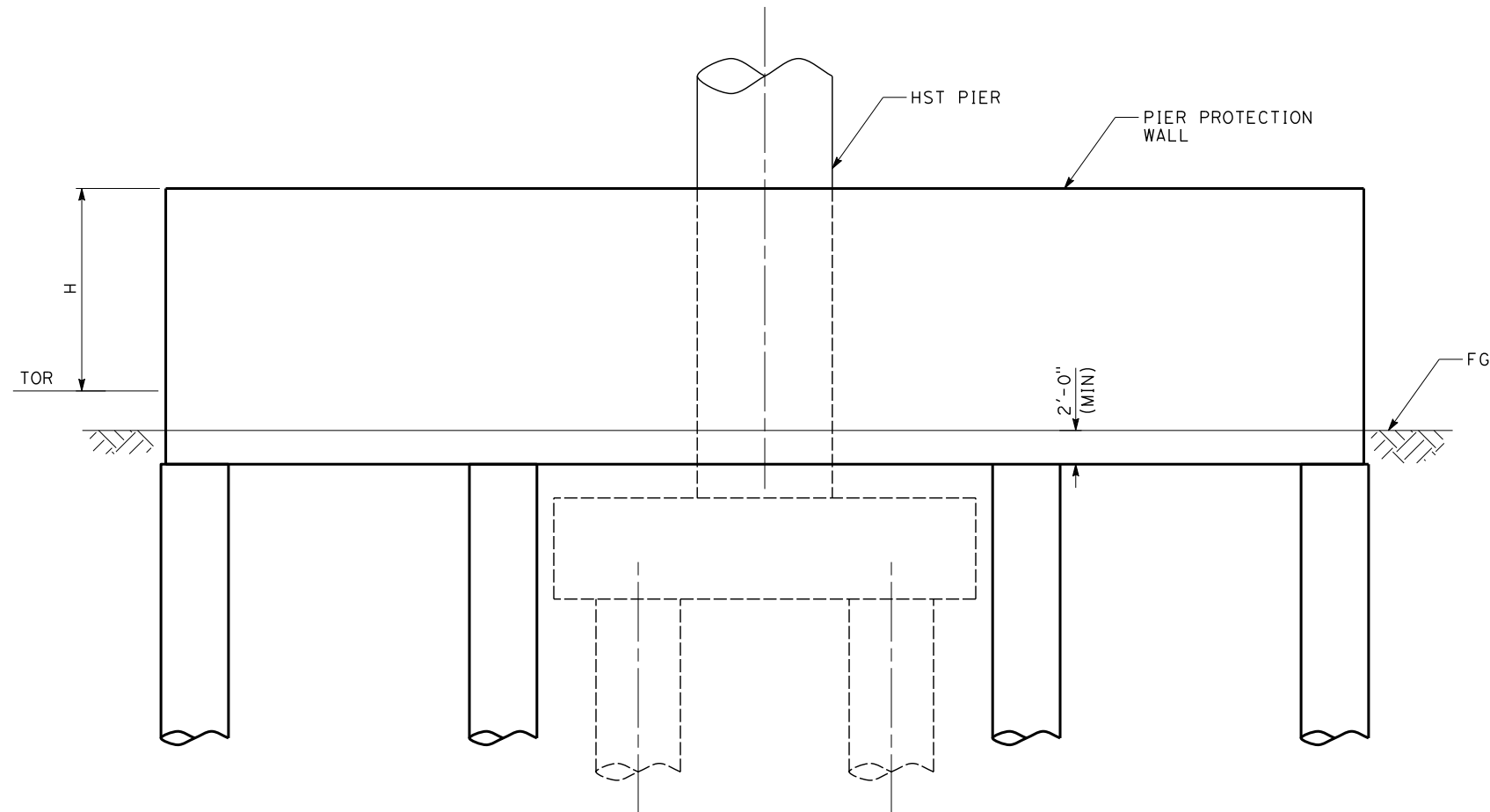
RAILROAD ADJACENT TO HST
AT-GRADE WITH INTRUSION PROTECTION

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| CONTRACT NO. |
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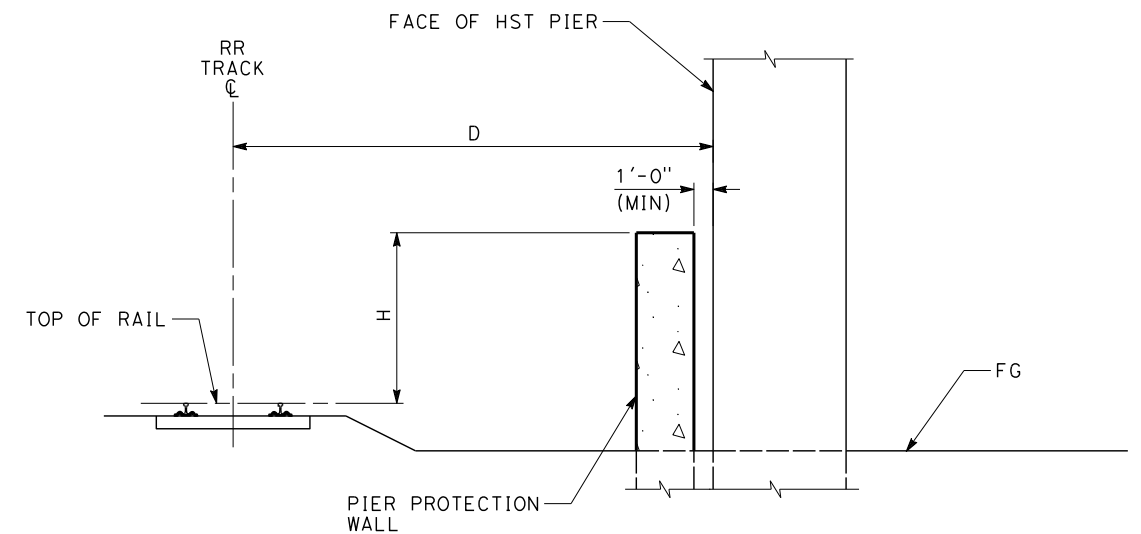
PLAN



ELEVATION

NOTES:

1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. PIER PROTECTION WALL IS REQUIRED IF CLEARANCE FROM FACE OF HST STRUCTURE TO NEAREST RAILROAD TRACK CENTERLINE IS LESS THAN 25'-0".
3. LOCATION WHERE PIER PROTECTION WALL IS REQUIRED SHALL BE DETERMINED THROUGH SITE SPECIFIC HAZARD ANALYSES.



HST STRUCTURE PIER - PROTECTION WALL

| CLEARANCE (D) | WALL HEIGHT ABOVE TOP OF RAIL (H) |
|---------------|-----------------------------------|
| ≥ 25 FT | N/A |
| 12 FT - 25 FT | 6 FT |
| ≤ 12 FT | 12 FT |

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| DATE 01/24/2014 |

PARSONS
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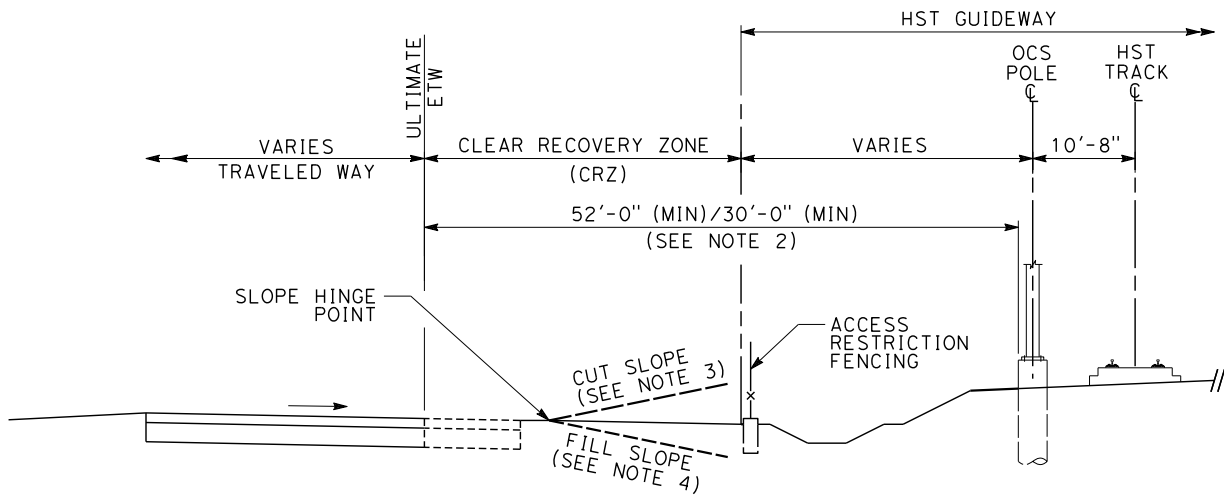
CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
INTRUSION PROTECTION DIRECTIVE

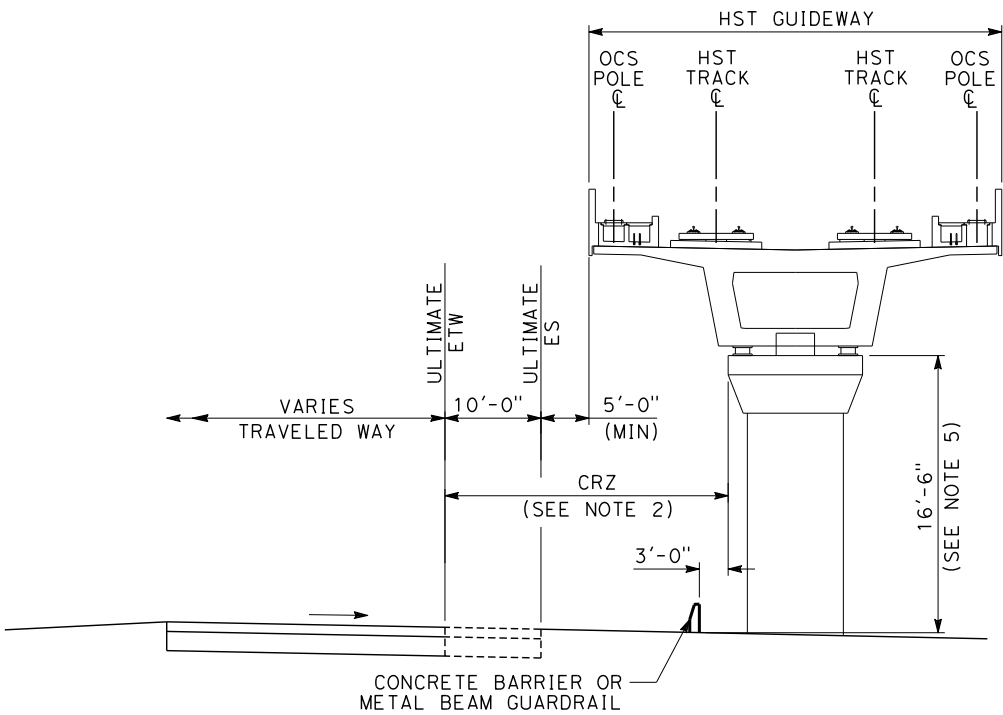
HST PIER PROTECTION
IN RAILROAD RIGHT OF WAY

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| CONTRACT NO. |
| DRAWING NO. DD-IP-102 |
| SCALE NO SCALE |
| SHEET NO. |

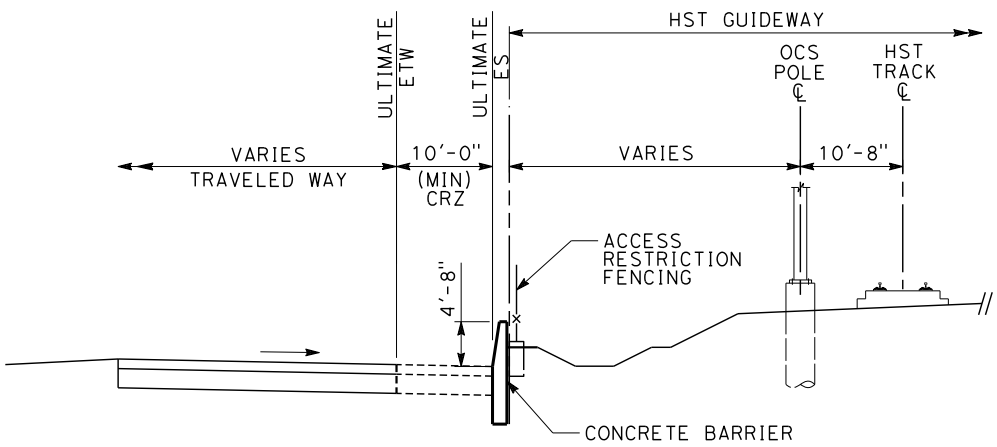
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HST AT GRADE ADJACENT TO HIGHWAY/ROADWAY



HST AERIAL STRUCTURE ADJACENT TO HIGHWAY/ROADWAY



**HST AT GRADE ADJACENT TO HIGHWAY/ROADWAY
WITH 10 FEET CLEAR RECOVERY ZONE (CRZ)**

NOTES:

1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. WHEN HST CORRIDOR IS CONSTRUCTED LONGITUDINALLY TO A FREEWAY, EXPRESSWAY, OR HIGHWAY, METAL BEAM GUARDRAIL OR CONCRETE BARRIER SHALL BE REQUIRED AT HST FIXED OBJECT IF THE DISTANCE FROM ULTIMATE ETW TO HST AERIAL STRUCTURE COLUMN, OR ANY HST FIXED OBJECT IS LESS THAN 52'-0". IF HST CORRIDOR IS NOT LONGITUDINAL TO A FREEWAY, EXPRESSWAY, OR HIGHWAY, THE CLEARANCE REQUIREMENT TO A HST FIXED OBJECT IS 30'-0".
3. IF HEIGHT DIFFERENTIAL AT ROADWAY CUT SLOPE HINGE POINT AND HST ROW FENCE IS GREATER THAN 7'-0", NO GUARDRAIL OR CONCRETE BARRIER IS REQUIRED.
4. IF THE HEIGHT DIFFERENTIAL AT ROADWAY FILL HINGE POINT AND HST ROW FENCE IS GREATER THAN 10'-0", GUARDRAIL WILL BE REQUIRED AT ROADWAY FILL HINGE POINT.
5. IF THE VERTICAL CLEARANCE BETWEEN THE RECOVERY AREA AND THE HST STRUCTURE BENT CAP IS LESS THAN 16'-6", METAL BEAM GUARDRAIL OR CONCRETE BARRIER WILL BE REQUIRED 3'-0" FROM EDGE OF HST BENT CAP.

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| DESIGNED BY A. ABTAHI |
| DRAWN BY V. HUANTE |
| CHECKED BY H. NGUYEN |
| IN CHARGE G. LUSHEROVICH |
| DATE 01/24/2014 |

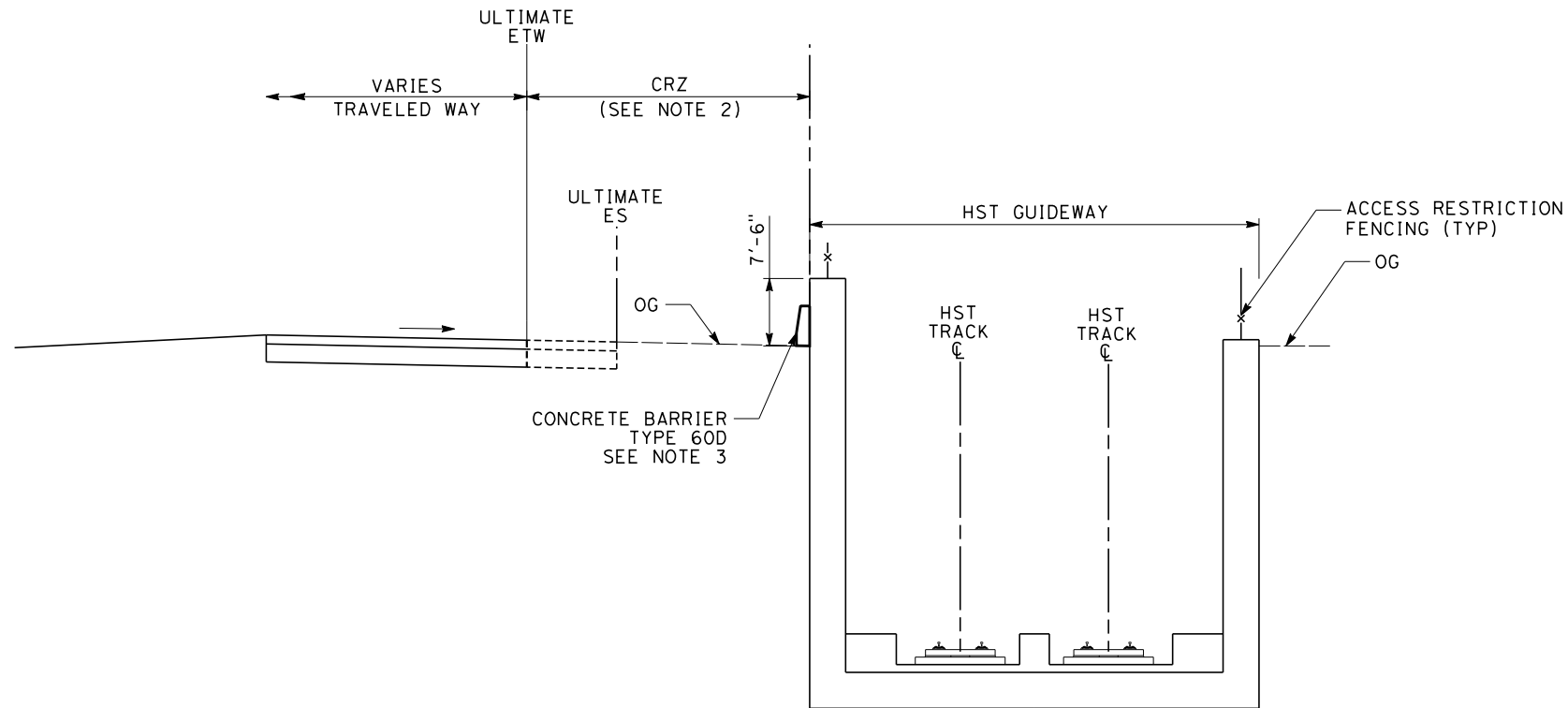
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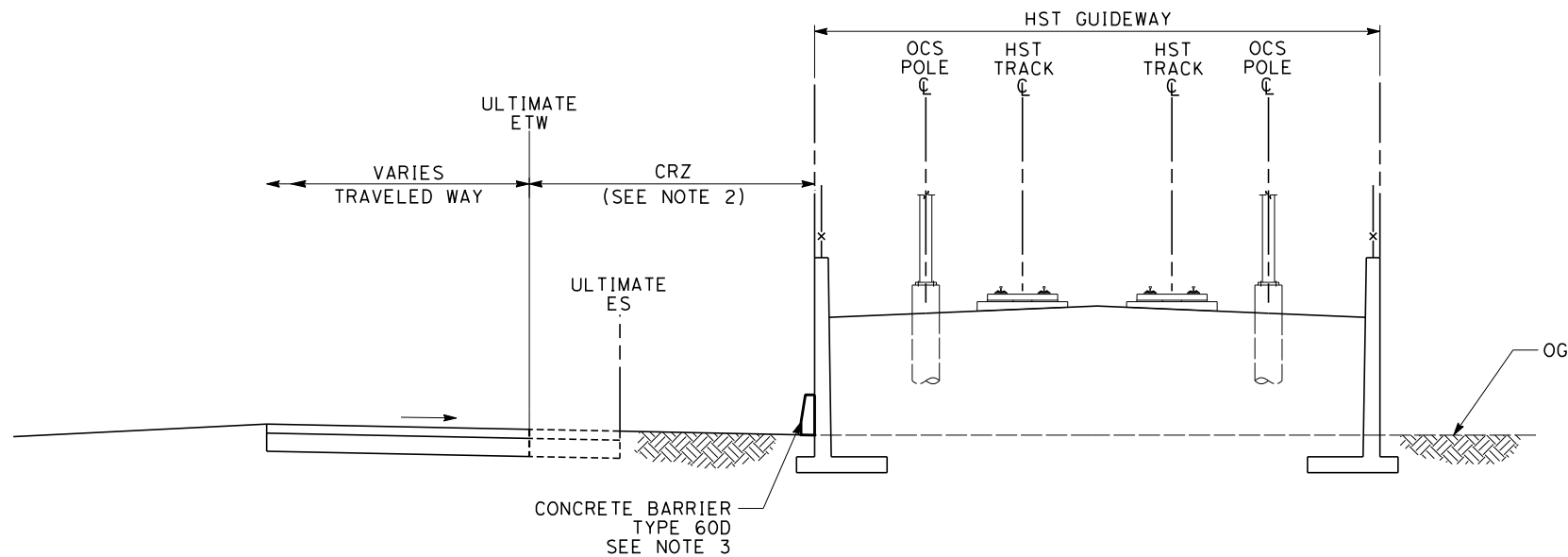
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| CALIFORNIA HIGH-SPEED TRAIN PROJECT INTRUSION PROTECTION DIRECTIVE |
| HST ADJACENT TO HIGHWAY/ROADWAY |

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| CONTRACT NO. |
| DRAWING NO. DD-IP-103 |
| SCALE NO SCALE |
| SHEET NO. |

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HIGHWAY/ROADWAY AT GRADE ADJACENT TO HST TRENCH



HIGHWAY/ROADWAY AT GRADE ADJACENT TO HST RETAINED FILL

NOTES:

1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. IF THE DISTANCE BETWEEN HST WALL AND THE ULTIMATE ETW IS LESS THAN 52'-0", THE WALL HEIGHT SHALL BE 7'-6" ABOVE THE GROUND SURFACE AND CALTRANS CONCRETE BARRIER TYPE 60D SHALL BE INCLUDED IN CONSTRUCTION OF THE WALL.
3. FOR CONCRETE BARRIER TYPE AND THE END TREATMENT OF THE CONCRETE BARRIER REFER TO CHAPTER 7 OF CALTRANS TRAFFIC MANUAL AND CALTRANS STANDARD PLANS.

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| DESIGNED BY A. ABTAHI |
| DRAWN BY V. HUANTE |
| CHECKED BY H. NGUYEN |
| IN CHARGE G. LUSHEROVICH |
| DATE 08/29/2014 |

PARSONS
BRINCKERHOFF



CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

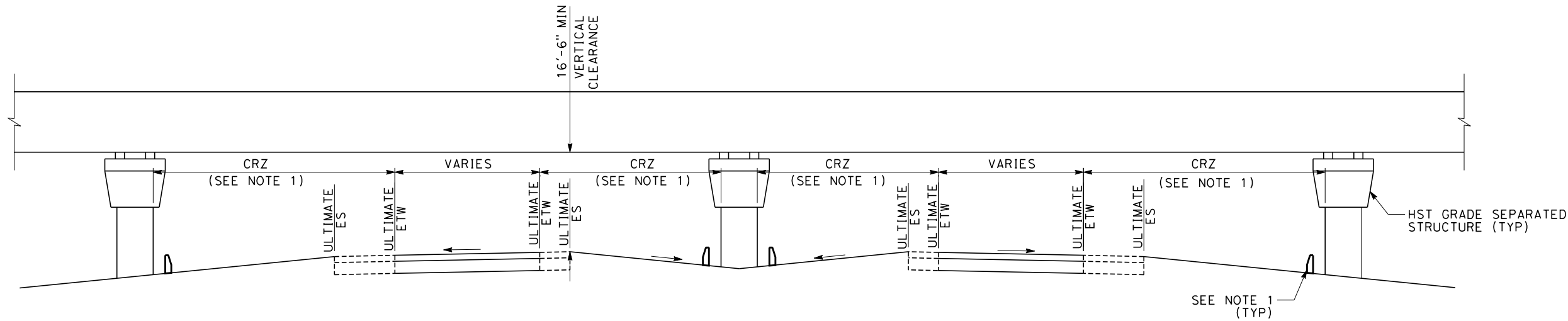
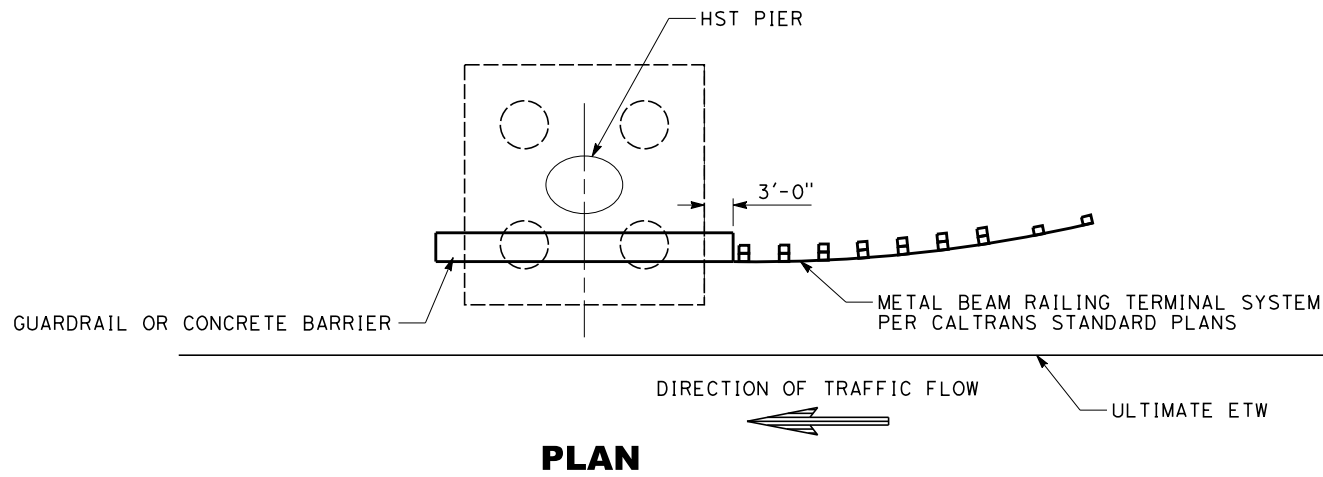
CALIFORNIA HIGH-SPEED TRAIN PROJECT
INTRUSION PROTECTION DIRECTIVE

HST TRENCH AND RETAINING WALL PROTECTION

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| CONTRACT NO. |
| DRAWING NO. DD-IP-104 |
| SCALE NO SCALE |
| SHEET NO. |

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- NOTES:
1. METAL BEAM GUARDRAIL OR CONCRETE BARRIER SHALL BE REQUIRED AT HST FIXED OBJECT IF THE DISTANCE FROM ULTIMATE ETW TO HST FIXED OBJECT IS LESS THAN 30'-0". REFER TO CHAPTER 7 OF CALTRANS TRAFFIC MANUAL AND CALTRANS STANDARD PLANS.



HST GRADE SEPARATED STRUCTURE OVER HIGHWAY/ROADWAY WITH MEDIAN

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| DESIGNED BY | A. ABTAHI |
| DRAWN BY | V. HUANTE |
| CHECKED BY | H. NGUYEN |
| IN CHARGE | G. LUSHEROVICH |
| DATE | 08/29/2014 |

PARSONS
BRINCKERHOFF



CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
INTRUSION PROTECTION DIRECTIVE

HST PIER PROTECTION
IN HIGHWAY/ROADWAY RIGHT-OF-WAY

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| CONTRACT NO. | |
| DRAWING NO. | DD-IP-105 |
| SCALE | NO SCALE |
| SHEET NO. | |

California High-Speed Rail Authority



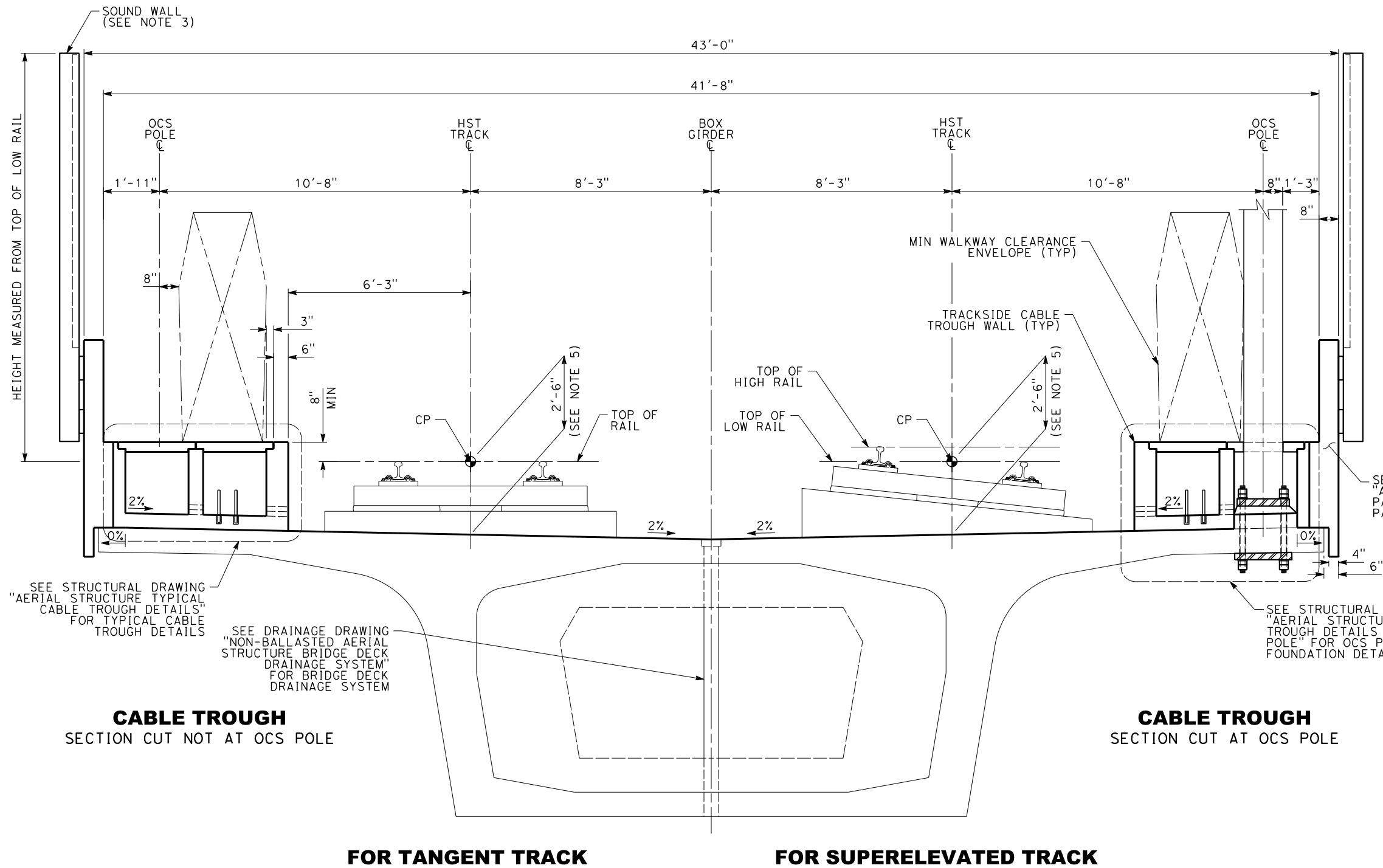
RFP No.: HSR 13-57

**Request for Proposals for Design-Build
Services for Construction Package 2-3**

**Book III, Part B.1
Directive Drawings**

Structure

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Mincio



NOTES:

1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. ON CURVED ALIGNMENT, THE RELATIVE DIMENSIONS BETWEEN BRIDGE DECK AND BOX GIRDER SHALL BE ADJUSTED PROPERLY. IF A STRAIGHT DECK EDGE IS SELECTED, THE WIDER DECK WIDTH MAY BE REQUIRED.
3. THE HEIGHT OF SOUND WALLS SHALL BE AS DEFINED IN THE TABLE 12-1 OF THE DESIGN CRITERIA. THE STRUCTURE AND CONNECTION BETWEEN PARAPET AND STRUCTURE DECK SHALL BE DESIGNED TO RESIST THE LOAD COMBINATIONS AS DESCRIBED IN TABLE 12-4 OF THE DESIGN CRITERIA TO ACCOMMODATE INSTALLATION OF SOUND WALLS. NO LONGITUDINAL GAPS SHALL BE PERMITTED BETWEEN THE BOTTOM OF SOUND WALL AND THE PARAPET OR DECK, NOR ANY VERTICAL GAPS BETWEEN ADJACENT SOUND WALL PANELS.
4. THE DIRECT FIXATION RAIL SYSTEM AND THE TRACK SLAB SHOWN ARE FOR ILLUSTRATION ONLY. THE CONTRACTOR SHALL DESIGN AND INSTALL SHEAR REINFORCEMENTS OR CONNECTORS, WHICH ARE CAPABLE OF TRANSFERRING THE TRACTION OR BRAKING FORCES AS DESCRIBED IN THE STRUCTURES CHAPTER OF THE DESIGN CRITERIA, IN THE STRUCTURAL DECK BELOW THE TRACK SLAB IN ACCORDANCE WITH THE PROVISIONS PROVIDED BY THE TRACK WORK DESIGNER THROUGH SYSTEM INTERFACE WORKSHOP MEETINGS. THE TOP SURFACE OF STRUCTURAL DECK BELOW THE TRACK SLAB SHALL BE PROPERLY ROUGHENED BY THE CONTRACTOR. SHEAR REINFORCEMENTS OR CONNECTORS SHALL BE HOT-DIP GALVANIZED. THE DESIGN AND INSTALLATION OF SHEAR REINFORCEMENTS OR CONNECTORS SHALL BE CONSIDERED AS PART OF THE CONTRACTOR'S SCOPE OF WORK.
5. FOR BALLASTED STRUCTURES, THE DESIGN DEPTH FROM TOP OF RAIL TO THE STRUCTURE DECK OR INVERT SHALL BE SET EQUAL TO 2'-9" PLUS ALLOWANCE FOR WATER PROOFING MEMBRANE AND PROTECTION LAYER.



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| DESIGNED BY P. LIN |
| DRAWN BY V. HUANTE |
| CHECKED BY K. PUGASAP |
| IN CHARGE G. LUSHEROVICH |
| DATE 07/18/2014 |

**PARSONS
BRINCKERHOFF**

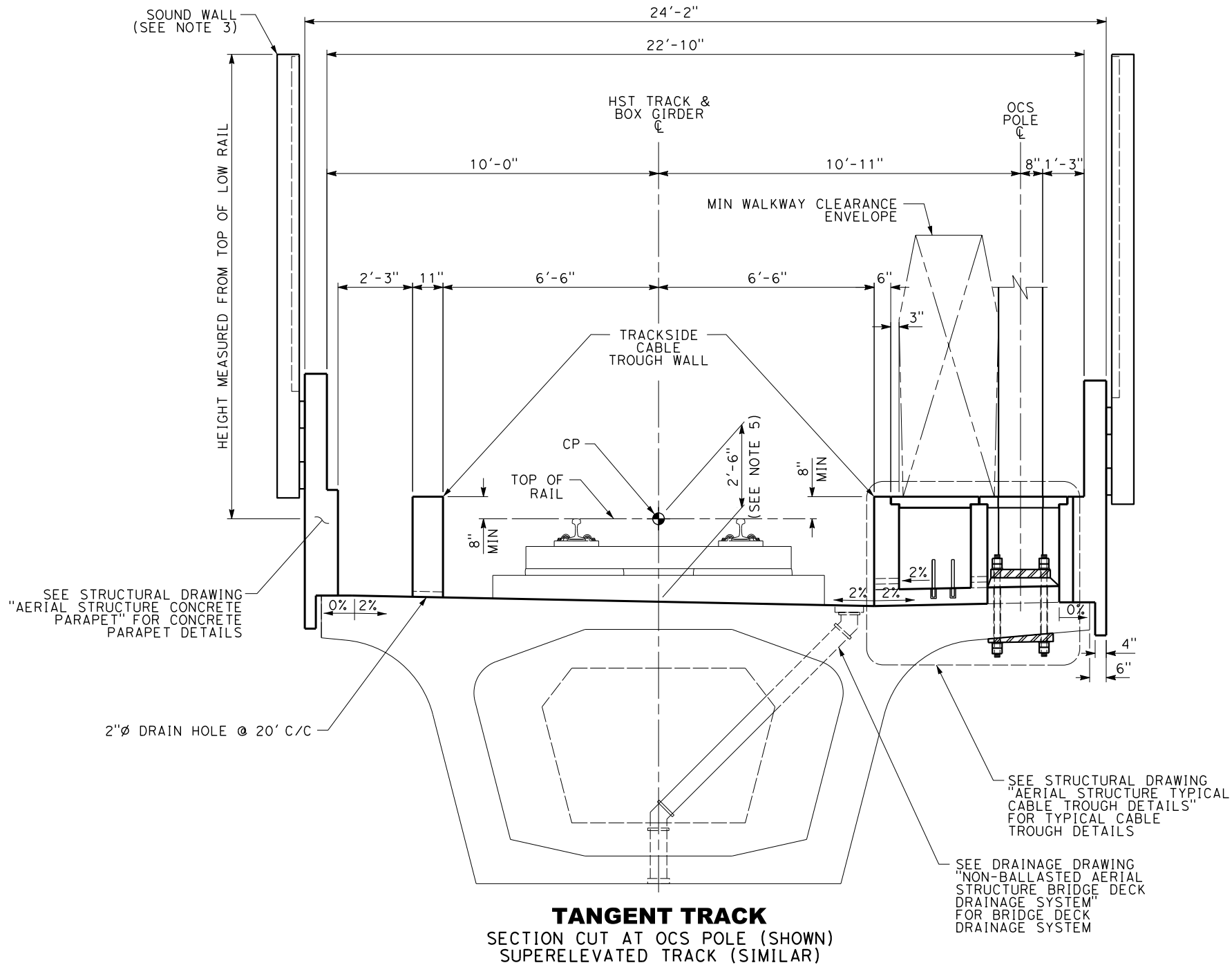


CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
STRUCTURAL DIRECTIVE
TYPICAL CROSS SECTION
AERIAL STRUCTURE
TWO TRACK NON-BALLASTED
TYPICAL CONFIGURATION ON TOP OF DECK

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| CONTRACT NO. |
| DRAWING NO. DD-ST-100 |
| SCALE AS SHOWN |
| SHEET NO. |

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- NOTES:**
1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
 2. ON CURVED ALIGNMENT, THE RELATIVE DIMENSIONS BETWEEN BRIDGE DECK AND BOX GIRDER SHALL BE ADJUSTED PROPERLY. IF A STRAIGHT DECK EDGE IS SELECTED, THE WIDER DECK WIDTH MAY BE REQUIRED.
 3. THE HEIGHT OF SOUND WALLS SHALL BE AS DEFINED IN THE TABLE 12-1 OF THE DESIGN CRITERIA. THE STRUCTURE AND CONNECTION BETWEEN PARAPET AND STRUCTURE DECK SHALL BE DESIGNED TO RESIST THE LOAD COMBINATIONS AS DESCRIBED IN TABLE 12-4 OF THE DESIGN CRITERIA TO ACCOMMODATE INSTALLATION OF SOUND WALLS. NO LONGITUDINAL GAPS SHALL BE PERMITTED BETWEEN THE BOTTOM OF SOUND WALL AND THE PARAPET OR DECK, NOR ANY VERTICAL GAPS BETWEEN ADJACENT SOUND WALL PANELS.
 4. THE DIRECT FIXATION RAIL SYSTEM AND THE TRACK SLAB SHOWN ARE FOR ILLUSTRATION ONLY. THE CONTRACTOR SHALL DESIGN AND INSTALL SHEAR REINFORCEMENTS OR CONNECTORS, WHICH ARE CAPABLE OF TRANSFERRING THE TRACTION OR BRAKING FORCES AS DESCRIBED IN THE STRUCTURES CHAPTER OF THE DESIGN CRITERIA, IN THE STRUCTURAL DECK BELOW THE TRACK SLAB IN ACCORDANCE WITH THE PROVISIONS PROVIDED BY THE TRACK WORK DESIGNER THROUGH SYSTEM INTERFACE WORKSHOP MEETINGS. THE TOP SURFACE OF STRUCTURAL DECK BELOW THE TRACK SLAB SHALL BE PROPERLY ROUGHENED BY THE CONTRACTOR. SHEAR REINFORCEMENTS OR CONNECTORS SHALL BE HOT-DIP GALVANIZED. THE DESIGN AND INSTALLATION OF SHEAR REINFORCEMENTS OR CONNECTORS SHALL BE CONSIDERED AS PART OF THE CONTRACTOR'S SCOPE OF WORK.
 5. FOR BALLASTED STRUCTURES, THE DESIGN DEPTH FROM TOP OF RAIL TO THE STRUCTURE DECK OR INVERT SHALL BE SET EQUAL TO 2'-9" PLUS ALLOWANCE FOR WATER PROOFING MEMBRANE AND PROTECTION LAYER.



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| DESIGNED BY P. LIN |
| DRAWN BY V. HUANTE |
| CHECKED BY K. PUGASAP |
| IN CHARGE G. LUSHEROVICH |
| DATE 07/18/2014 |

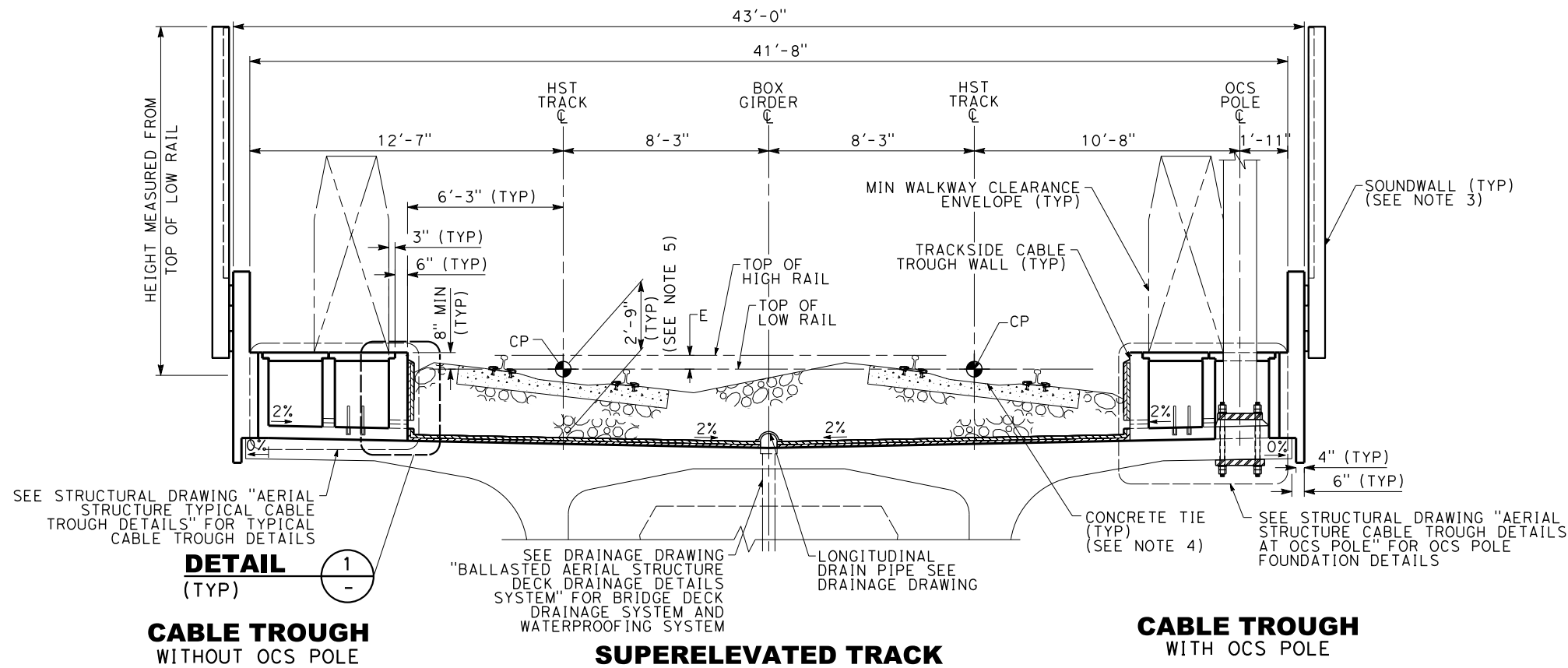
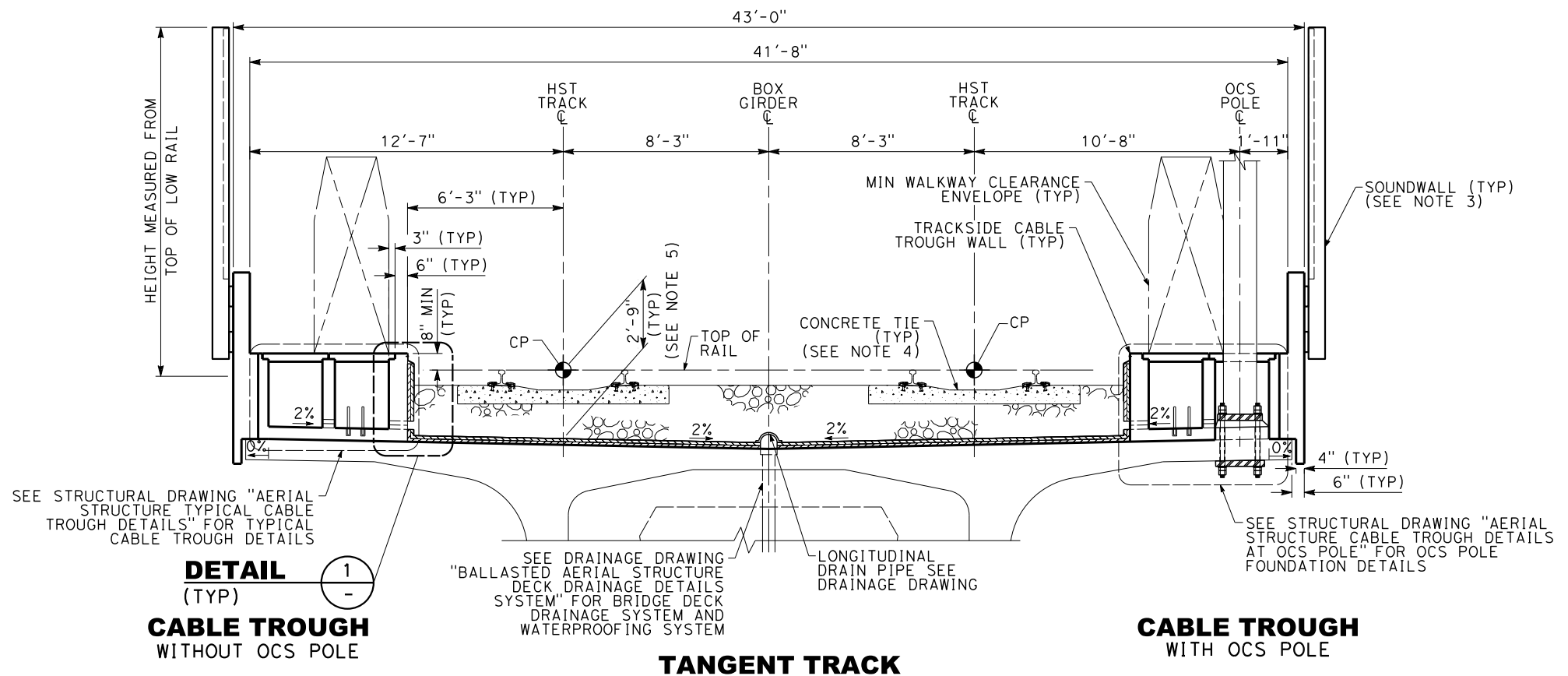
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| CALIFORNIA HIGH-SPEED TRAIN PROJECT |
| STRUCTURAL DIRECTIVE |
| TYPICAL CROSS SECTION |
| AERIAL STRUCTURE |
| ONE TRACK NON-BALLASTED |
| TYPICAL CONFIGURATION ON TOP OF DECK |

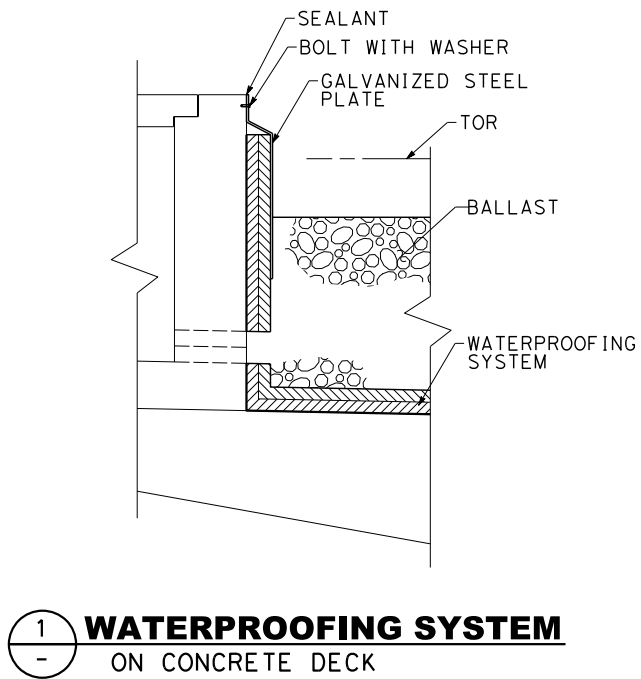
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NOTES:

1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. ON CURVED ALIGNMENT, THE RELATIVE DIMENSIONS BETWEEN BRIDGE DECK AND BOX GIRDER SHALL BE ADJUSTED PROPERLY. IF A STRAIGHT DECK EDGE IS SELECTED, THE WIDER DECK WIDTH MAY BE REQUIRED.
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4. CONCRETE TIES SHOWN ARE FOR ILLUSTRATION ONLY.
5. FOR BALLASTED STRUCTURES, THE DESIGN DEPTH FROM TOP OF RAIL TO THE STRUCTURE DECK OR INVERT SHALL BE SET EQUAL TO 2'-9" PLUS ALLOWANCE FOR WATER PROOFING MEMBRANE AND PROTECTION LAYER.



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| DESIGNED BY P. LIN |
| DRAWN BY V. HUANTE |
| CHECKED BY G. HARRIS |
| IN CHARGE G. LUSHEROVICH |
| DATE 07/18/2014 |

**PARSONS
BRINCKERHOFF**

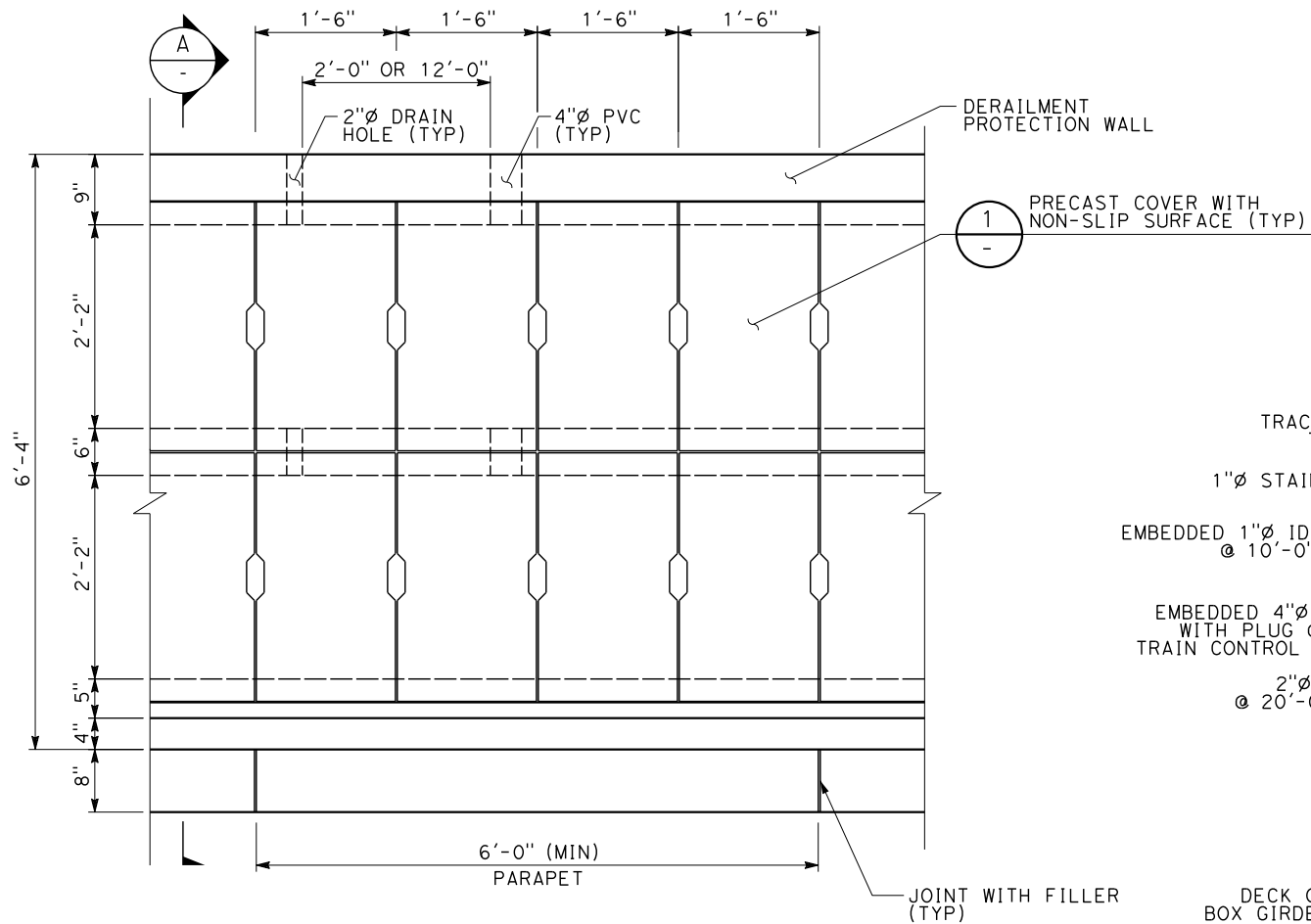


CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

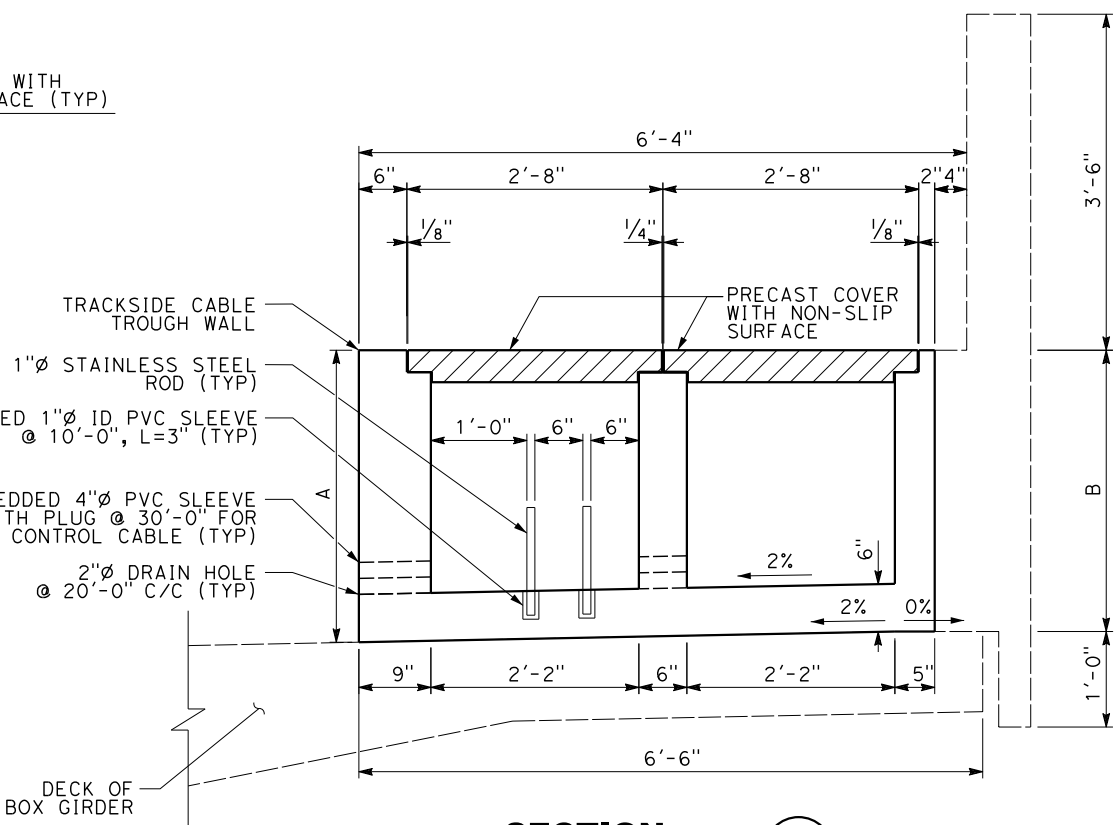
**CALIFORNIA HIGH-SPEED TRAIN PROJECT
STRUCTURAL DIRECTIVE**
TYPICAL CROSS SECTION
AERIAL STRUCTURE
TWO TRACK BALLASTED
TYPICAL CONFIGURATION ON TOP OF DECK

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| CONTRACT NO. |
| DRAWING NO. DD-ST-102 |
| SCALE NO SCALE |
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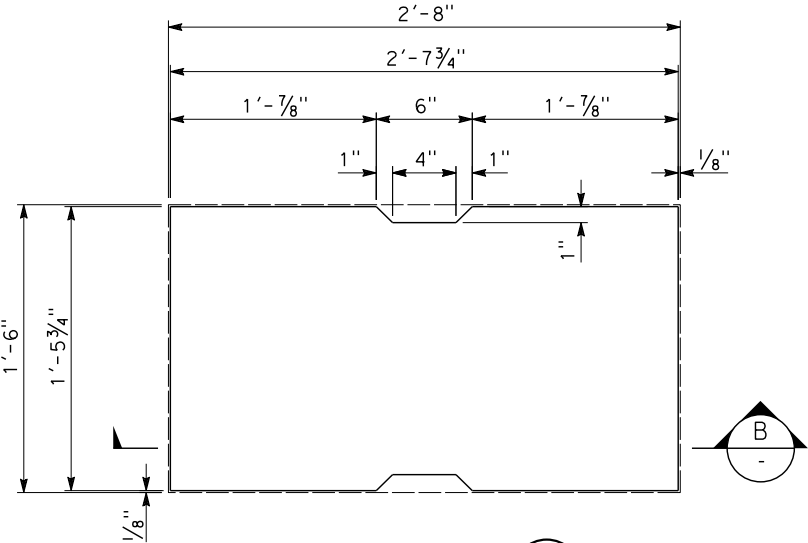
CABLE TROUGH PLAN
SCALE: 1"=1'-0"



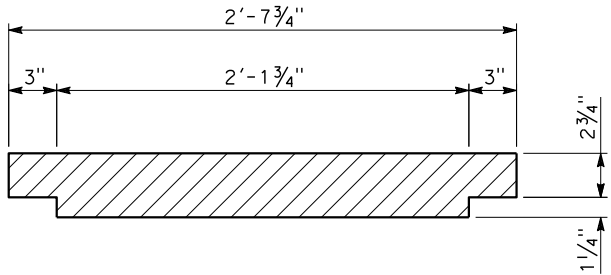
SECTION
SCALE: 1"=1'-0"

| | NON-BALLASTED TRACK | | BALLASTED TRACK | |
|---|---------------------|------------|-----------------|-----------------|
| | TWO TRACK | ONE TRACK | TWO TRACK | ONE TRACK |
| A | 3'-1/2" | 3'-3 3/16" | 3'-3 1/2" + T* | 3'-6 3/16" + T* |
| B | 2'-11 1/8" | 3'-2 1/4" | 2'-2 1/8" + T* | 3'-5 1/4" + T* |

T* = SUM OF WATERPROOFING MEMBRANE THICKNESS AND PROTECTION LAYER THICKNESS



DETAIL
SCALE: 1/2"=1'-0"



SECTION
SCALE: 1/2"=1'-0"

- NOTES:**
1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
 2. THE CABLE TROUGH DETAIL IS FOR STANDARD TWO TRACK. FOR CABLE TROUGH INFORMATION IN SPECIAL TRACK AREA, THE CONTRACTOR SHALL COORDINATE WITH THE INTERFACED TRACK WORK DESIGNER FOR DETAILED INFORMATION.

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| DESIGNED BY P. LIN |
| DRAWN BY V. HUANTE |
| CHECKED BY K. PUGASAP |
| IN CHARGE G. LUSHEROVICH |
| DATE 01/24/2014 |

**PARSONS
BRINCKERHOFF**



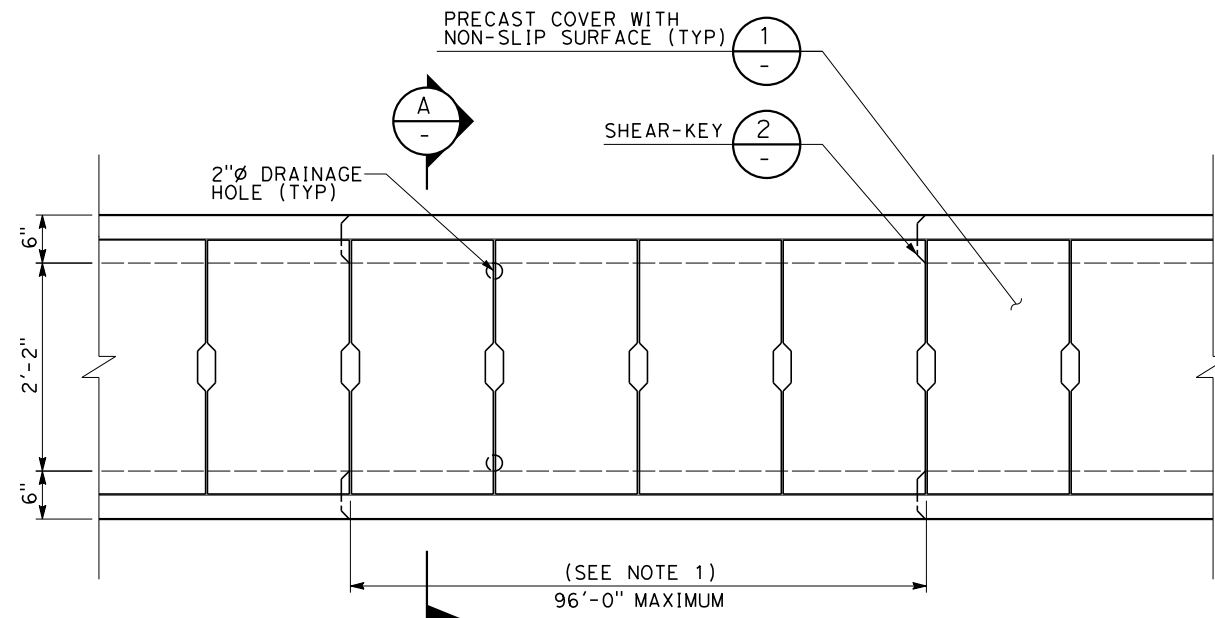
CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

**CALIFORNIA HIGH-SPEED TRAIN PROJECT
STRUCTURAL DIRECTIVE**

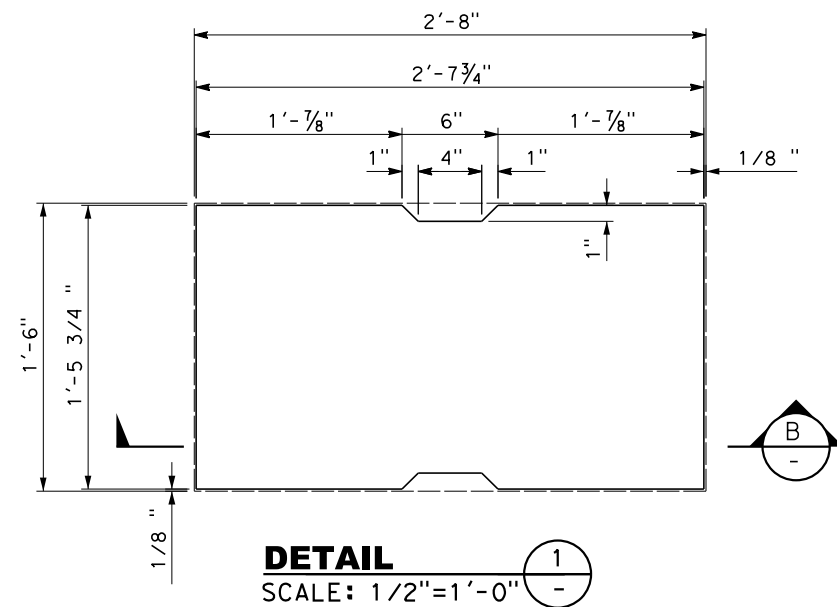
AERIAL STRUCTURE
TYPICAL CABLE TROUGH DETAILS

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| CONTRACT NO. |
| DRAWING NO. DD-ST-900 |
| SCALE AS SHOWN |
| SHEET NO. |

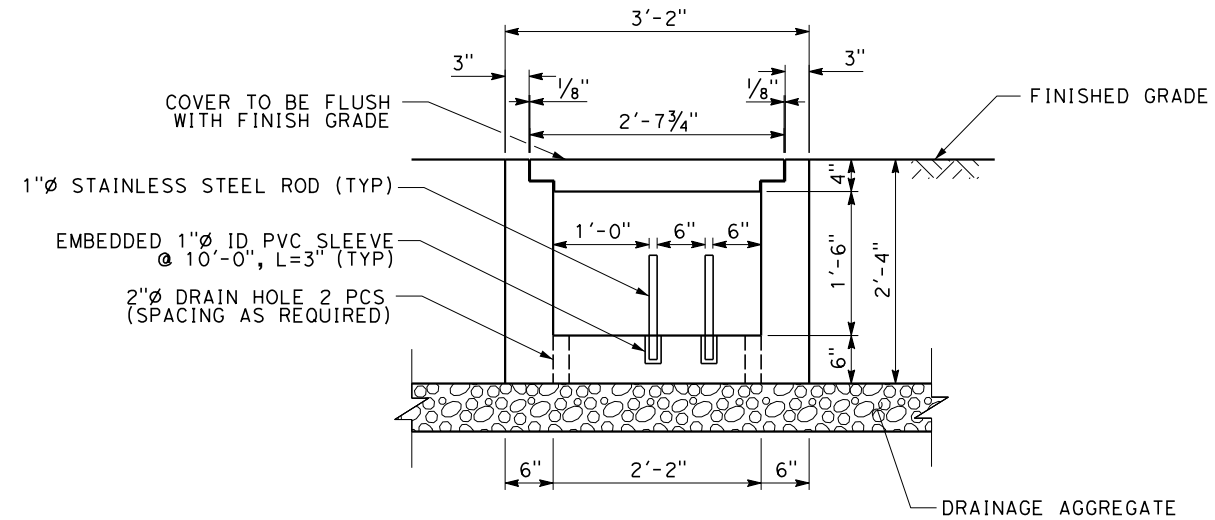
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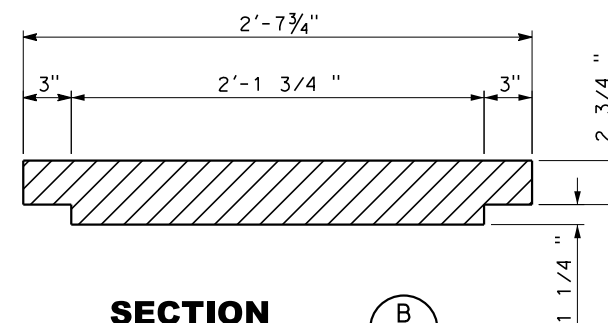
PRECAST CABLE TROUGH PLAN
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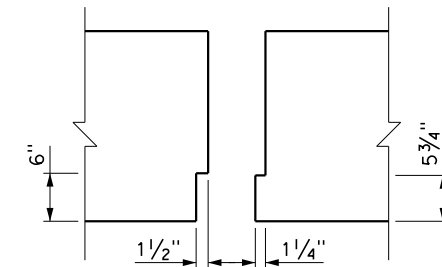
DETAIL 1
SCALE: 1/2"=1'-0"



SECTION A-A
SCALE: 1"=1'-0"



SECTION B-B
SCALE: 1/2"=1'-0"



DETAIL 2
SCALE: 1"=1'-0"

NOTES:

1. CONTRACTOR SHALL DETERMINE WORK SEGMENT LENGTH BASED ON CONSTRUCTION METHOD.

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| DESIGNED BY B. VALENTI |
| DRAWN BY V. LAVERDE |
| CHECKED BY P. LIN |
| IN CHARGE G. LUSHEROVICH |
| DATE 08/29/2014 |

**PARSONS
BRINCKERHOFF**



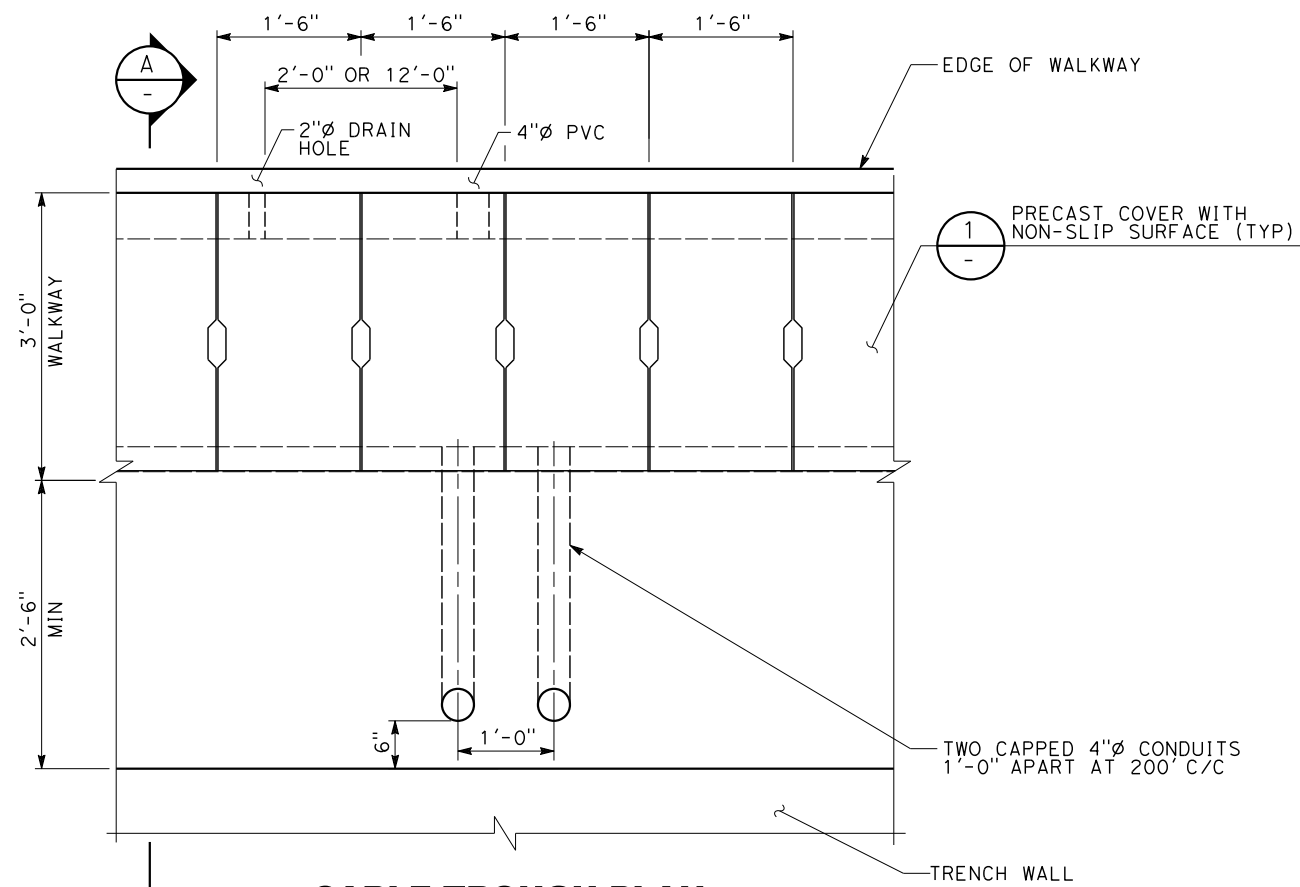
CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

**CALIFORNIA HIGH-SPEED TRAIN PROJECT
STRUCTURAL DIRECTIVE**

TYPICAL CABLE TROUGH DETAILS
EMBANKMENT/CUT

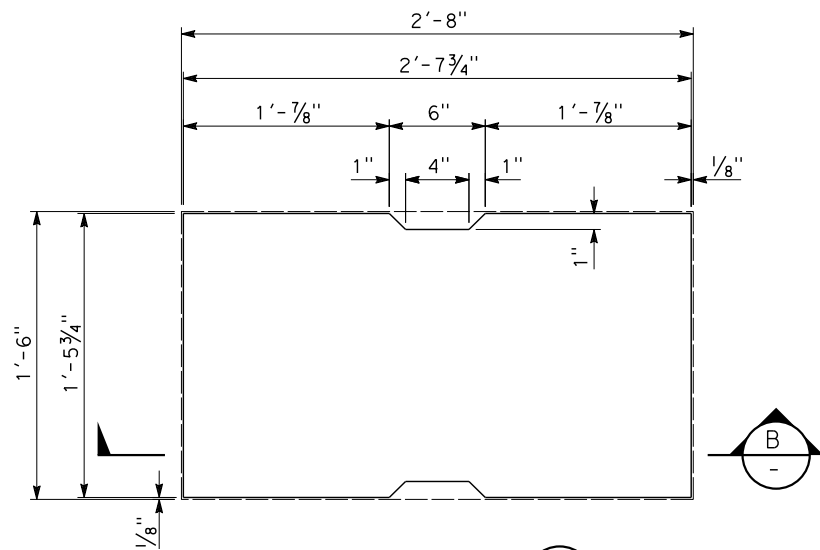
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| DRAWING NO. DD-ST-901 |
| SCALE AS SHOWN |
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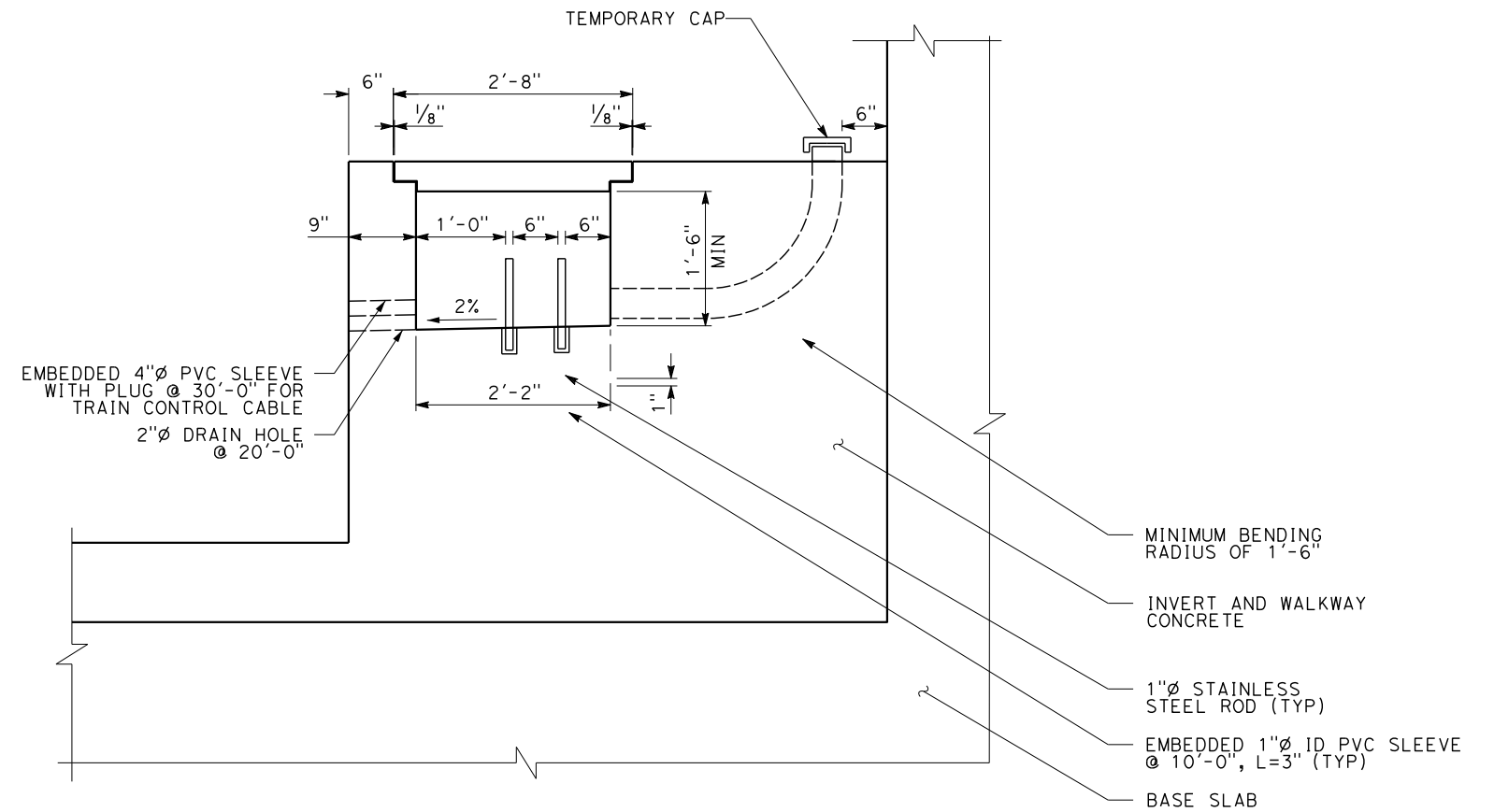
CABLE TROUGH PLAN AND CONDUIT DETAIL

SCALE: 1"=1'-0"



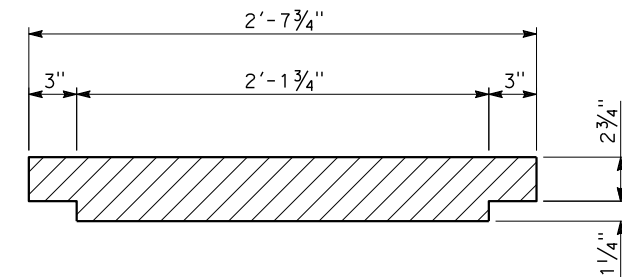
DETAIL

SCALE: 1/2"=1'-0"



SECTION

SCALE: 1"=1'-0"



SECTION

SCALE: 1/2"=1'-0"

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| DESIGNED BY B. VALENTI |
| DRAWN BY V. HUANTE |
| CHECKED BY P. LIN |
| IN CHARGE J. CHIRCO |
| DATE 01/24/2014 |

**PARSONS
BRINCKERHOFF**



CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

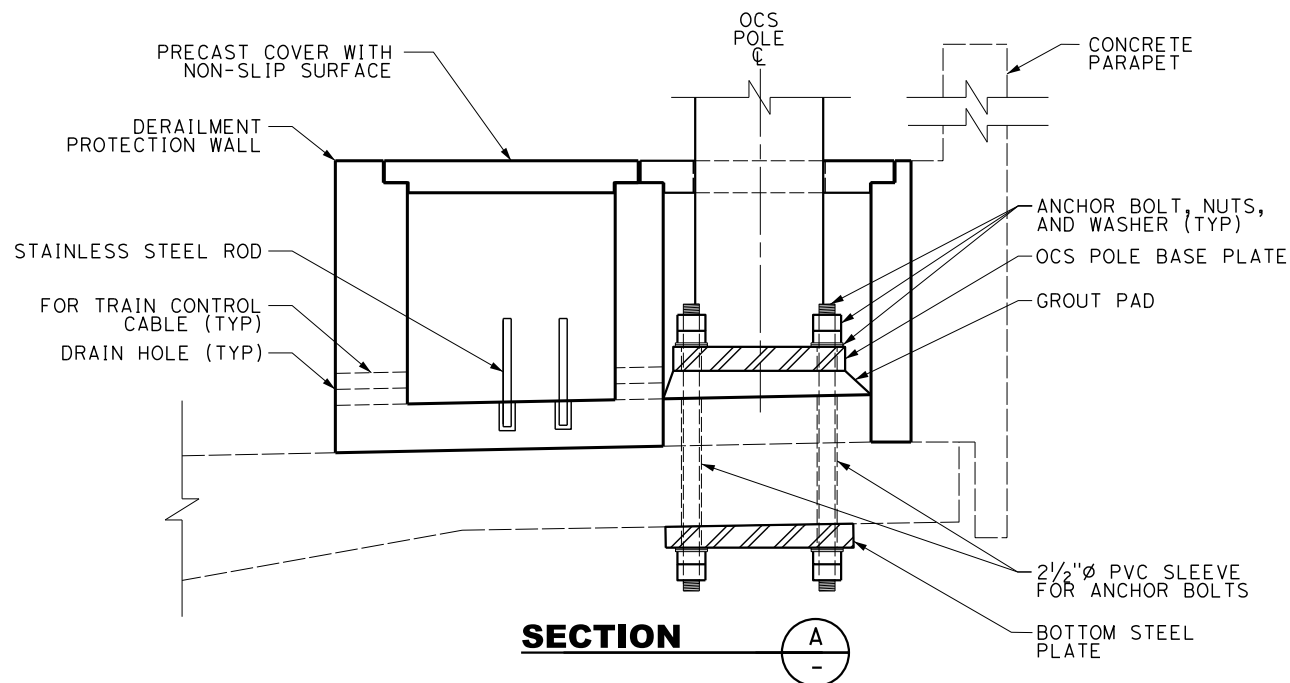
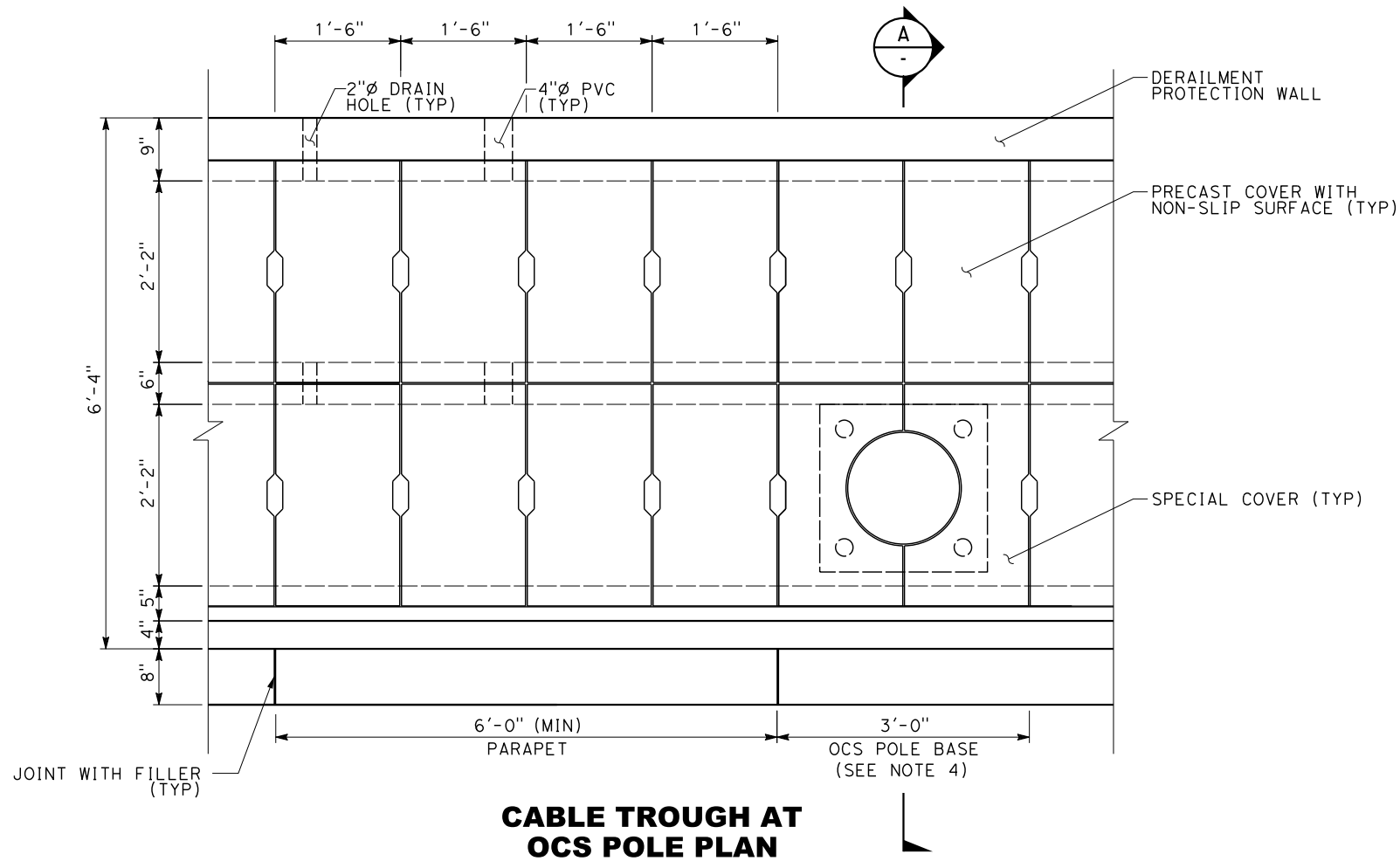
**CALIFORNIA HIGH-SPEED TRAIN PROJECT
STRUCTURAL DIRECTIVE**

CABLE TROUGH DETAILS
TRENCH/CUT AND COVER TUNNEL

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| CONTRACT NO. |
| DRAWING NO. DD-ST-902 |
| SCALE AS SHOWN |
| SHEET NO. |

04/02/2014 - RFP No.: HSR 13-57

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NOTES:

1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. FOR PRECAST COVER DETAIL, SEE DRAWING "AERIAL STRUCTURE TYPICAL CABLE TROUGH DETAILS".
3. SEE STRUCTURAL DRAWING "AERIAL STRUCTURE TYPICAL CABLE TROUGH DETAILS" FOR DIMENSIONS NOT SHOWN.
4. OCS POLE, ANCHOR BOLT ASSEMBLIES, BASE PLATES, AND GROUT PAD FOR OCS POLE FOUNDATION ARE SHOWN FOR ILLUSTRATION ONLY. THE LOCATION OF EMBEDDED PVC SLEEVES AND LOADS FOR DESIGN OF OCS POLE FOUNDATION SHALL CONFORM TO THE REQUIREMENTS IN THE STRUCTURAL CHAPTER OF THE DESIGN CRITERIA.



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| DESIGNED BY P. LIN |
| DRAWN BY V. HUANTE |
| CHECKED BY K. PUGASAP |
| IN CHARGE G. LUSHEROVICH |
| DATE 01/24/2014 |

**PARSONS
BRINCKERHOFF**



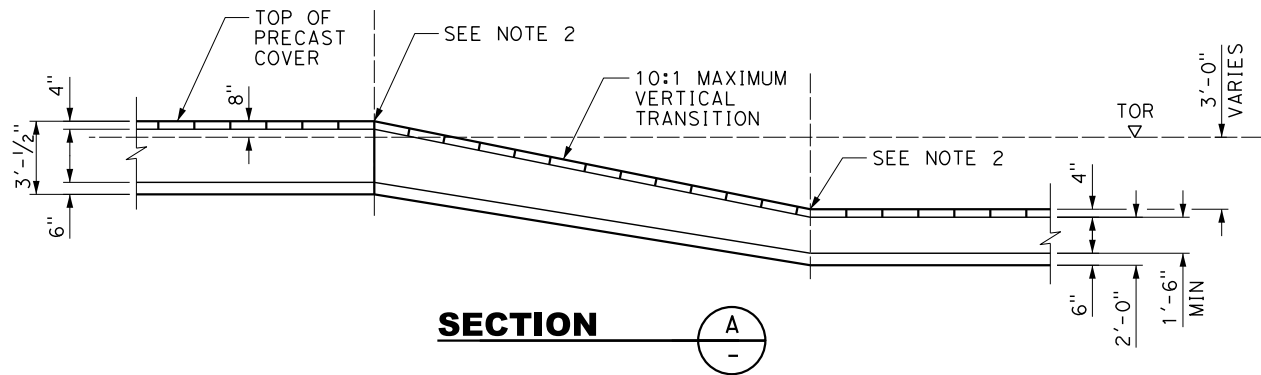
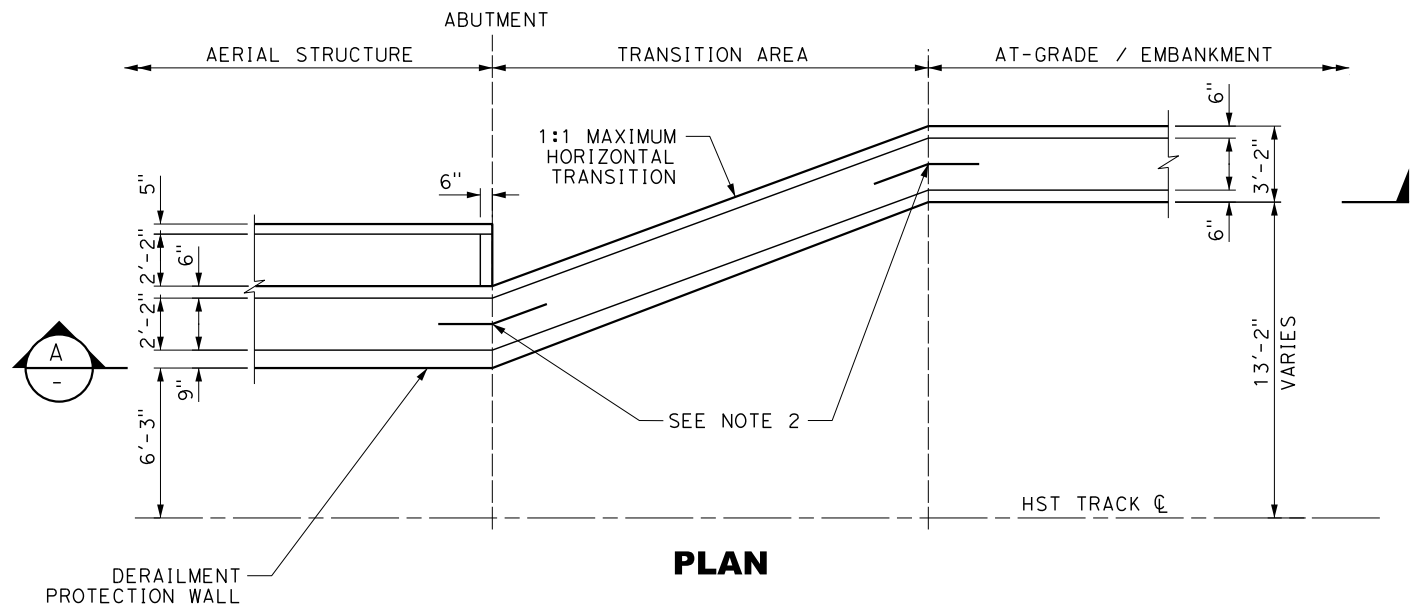
CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

**CALIFORNIA HIGH-SPEED TRAIN PROJECT
STRUCTURAL DIRECTIVE**

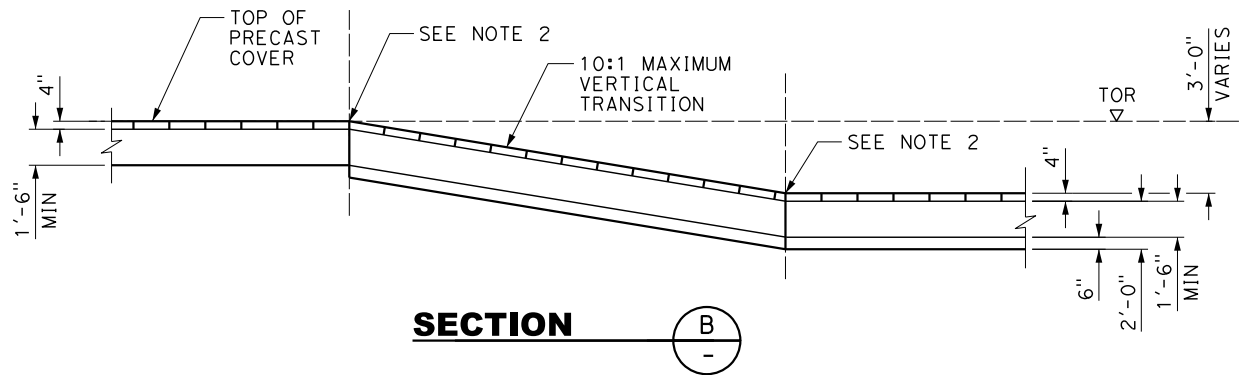
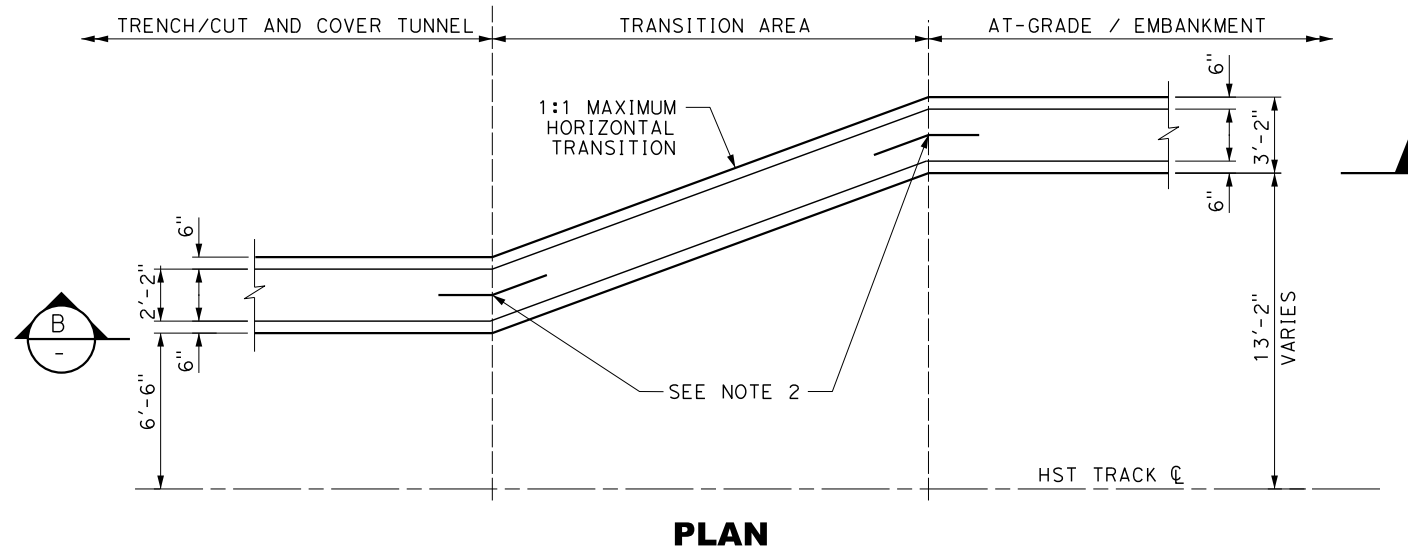
AERIAL STRUCTURE
CABLE TROUGH DETAILS
AT OCS POLE

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AERIAL STRUCTURE TO AT-GRADE/EMBANKMENT



TRENCH/CUT AND COVER TUNNEL TO AT-GRADE/EMBANKMENT

- NOTES:
- BOTH HORIZONTAL AND VERTICAL TRANSITION OF THE CABLE TROUGH SHALL OCCUR WITHIN THE LONGITUDINAL STRUCTURAL TRANSITION ZONE.
 - SPECIAL TRANSITION TROUGH AND COVER WILL BE REQUIRED AT ANGLE POINTS. MAXIMIZE EXTENT OF STANDARD PIECES.



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| DESIGNED BY P. LIN |
| DRAWN BY V. HUANTE |
| CHECKED BY B. VALENTI |
| IN CHARGE G. LUSHEROVICH |
| DATE 01/24/2014 |

PARSONS
BRINCKERHOFF



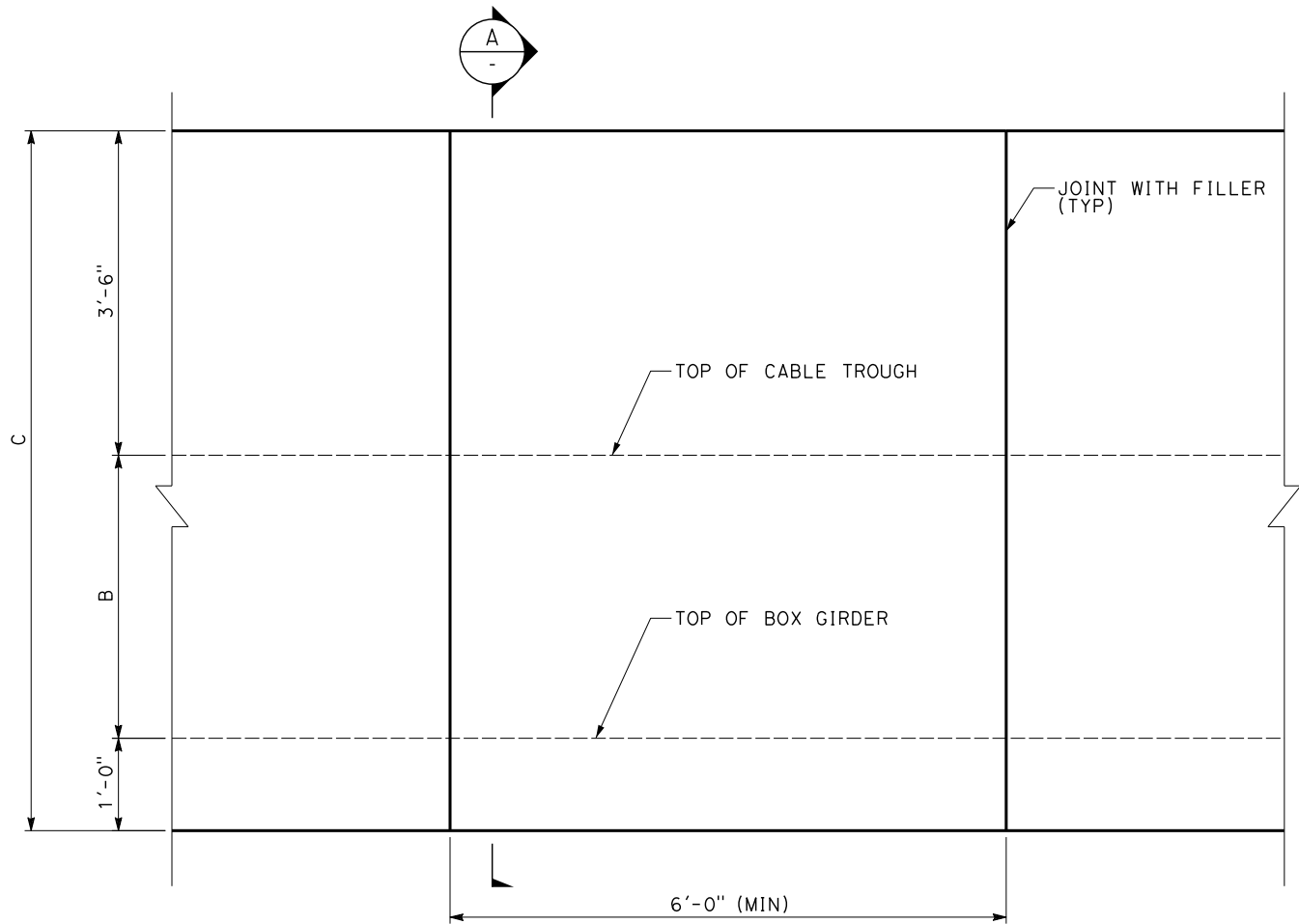
CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
STRUCTURAL DIRECTIVE

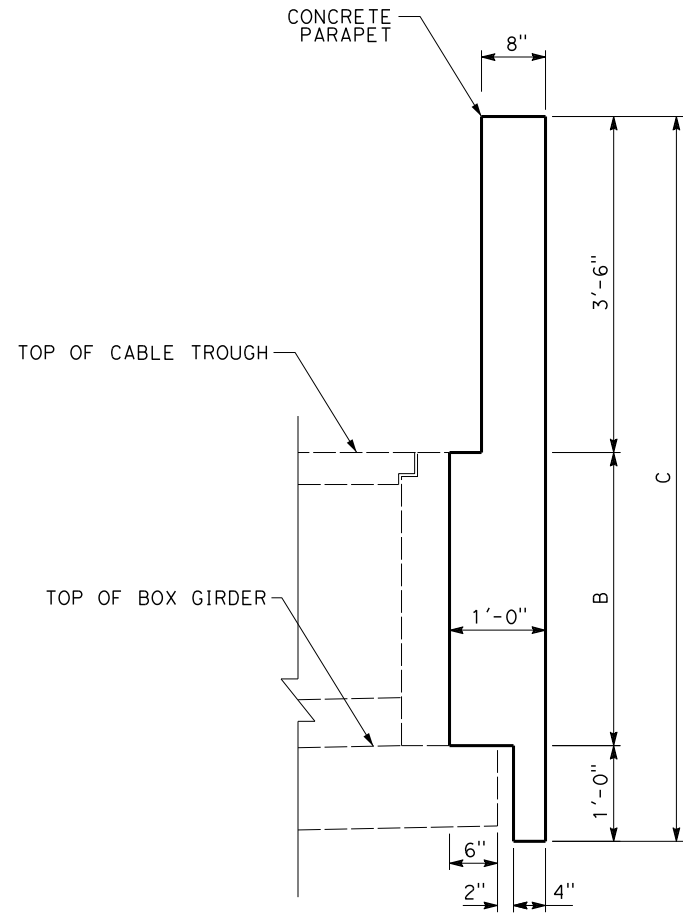
CABLE TROUGH LAYOUT TRANSITION AREAS

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| CONTRACT NO. |
| DRAWING NO. DD-ST-904 |
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| SHEET NO. |

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CONCRETE PARAPET
ELEVATION VIEW



SECTION
A

| NON-BALLASTED TRACK | | | BALLASTED TRACK | |
|---------------------|------------|-----------|-----------------|-----------------|
| | TWO TRACK | ONE TRACK | TWO TRACK | ONE TRACK |
| B | 2'-11 1/8" | 3'-2 1/4" | 3'-2 1/8" + T* | 3'-5 1/4" + T* |
| C | 7'-5 5/8" | 7'-8 1/4" | 7'-8 5/8" + T* | 7'-11 1/4" + T* |

T* = SUM OF WATERPROOFING MEMBRANE THICKNESS AND PROTECTION LAYER THICKNESS



- NOTES:**
- PARAPETS SHALL BE PROVIDED ALONG EDGES OF AERIAL STRUCTURES, BRIDGES, AND HST GRADE SEPARATIONS.
 - PARAPETS SHALL BE DESIGNED FOR WIND LOADS, SLIPSTREAM EFFECTS, AND OTHER LOADS REQUIRED IN THE STRUCTURES CHAPTER OF THE DESIGN CRITERIA.
 - PARAPETS SHALL BE DESIGNED TO ACCOMMODATE FUTURE INSTALLATION OF SOUND WALLS.
 - AT CONSTRUCTION JOINTS OF CONCRETE PARAPETS, A JOINT WITH FILLER SHALL BE PROVIDED. IN ADDITION, A PARAPET EXPANSION JOINT SHALL BE DESIGNED AND PROVIDED AT EVERY AERIAL STRUCTURE AND BRIDGE EXPANSION JOINT LOCATION. THE INSIDE FACE OF JOINT OPENING SHALL BE COVERED WITH A GALVANIZED STEEL PLATE SECURELY FASTENED TO THE INSIDE FACE OF THE PARAPET ON ONE SIDE OF THE EXPANSION JOINT WITH A LENGTH OF THREE INCHES MORE THAN THE MAXIMUM JOINT MOVEMENT LENGTH.

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| DESIGNED BY P. LIN |
| DRAWN BY V. HUANTE |
| CHECKED BY K. PUGASAP |
| IN CHARGE G. LUSHEROVICH |
| DATE 01/24/2014 |

PARSONS
BRINCKERHOFF



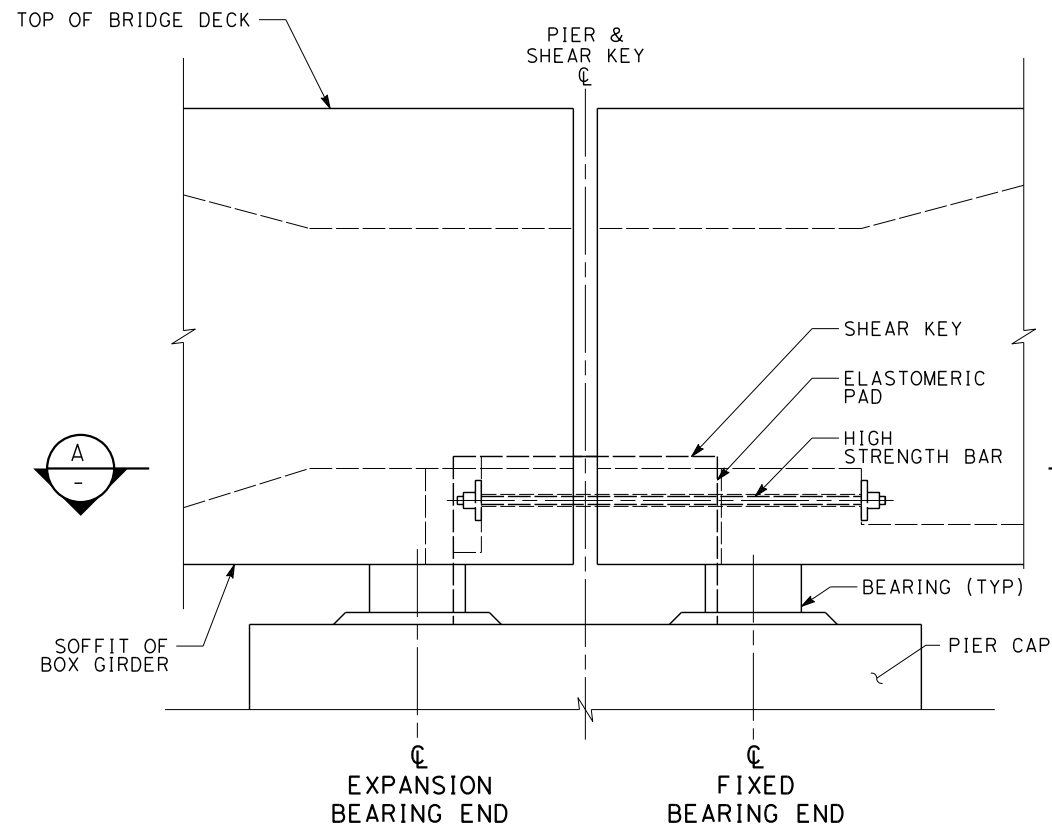
CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
STRUCTURAL DIRECTIVE

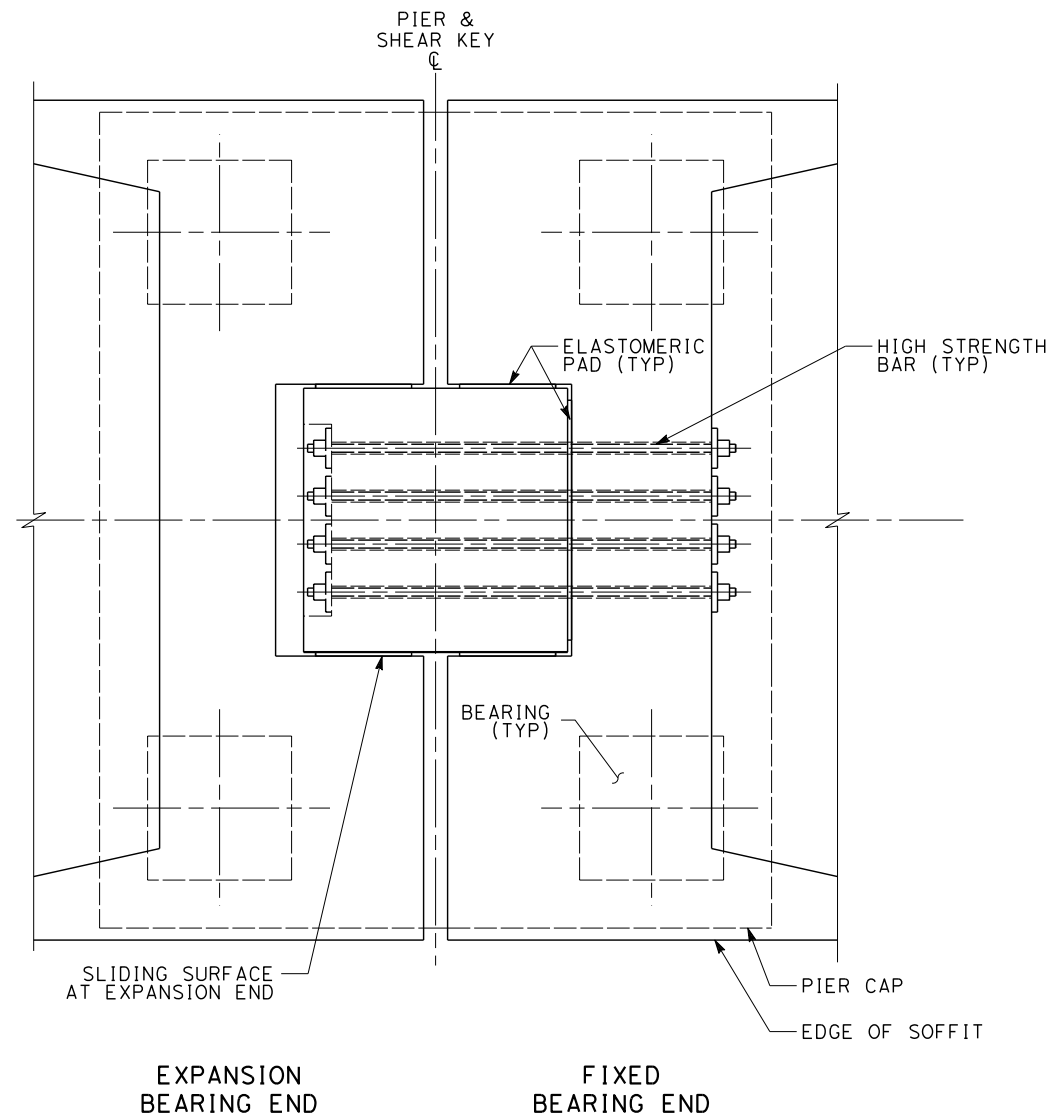
AERIAL STRUCTURE
CONCRETE PARAPET

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| CONTRACT NO. |
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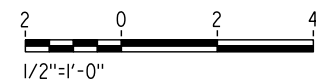
ELEVATION
CONCRETE PARAPET NOT SHOWN



SECTION
1/2" = 1'-0"

NOTES:

1. THE SHEAR KEY DETAILS SHOWN ARE FOR ILLUSTRATION ONLY. THE CONTRACTOR SHALL DEVELOP A SHEAR KEY SYSTEM THAT CONFORMS TO THE REQUIREMENTS IN THE STRUCTURES CHAPTER OF THE DESIGN CRITERIA.
2. BEARINGS SHALL BE EASILY ACCESSIBLE FOR INSPECTION AND MAINTENANCE. BEARINGS SHALL BE ADJUSTABLE AND REPLACEABLE AT ANYTIME DURING THE LIFE OF STRUCTURES WITHOUT INTERFERENCE TO NORMAL TRAIN OPERATIONS.
3. THE PROCEDURES FOR BEARING REPLACEMENT, INCLUDING THE LOCATIONS OF JACKS AND THE ALLOWED JACKING FORCES SHALL BE SPECIFIED ON THE DRAWINGS.



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| DESIGNED BY P. LIN |
| DRAWN BY V. HUANTE |
| CHECKED BY K. PUGASAP |
| IN CHARGE G. LUSHEROVICH |
| DATE 01/24/2014 |

**PARSONS
BRINCKERHOFF**



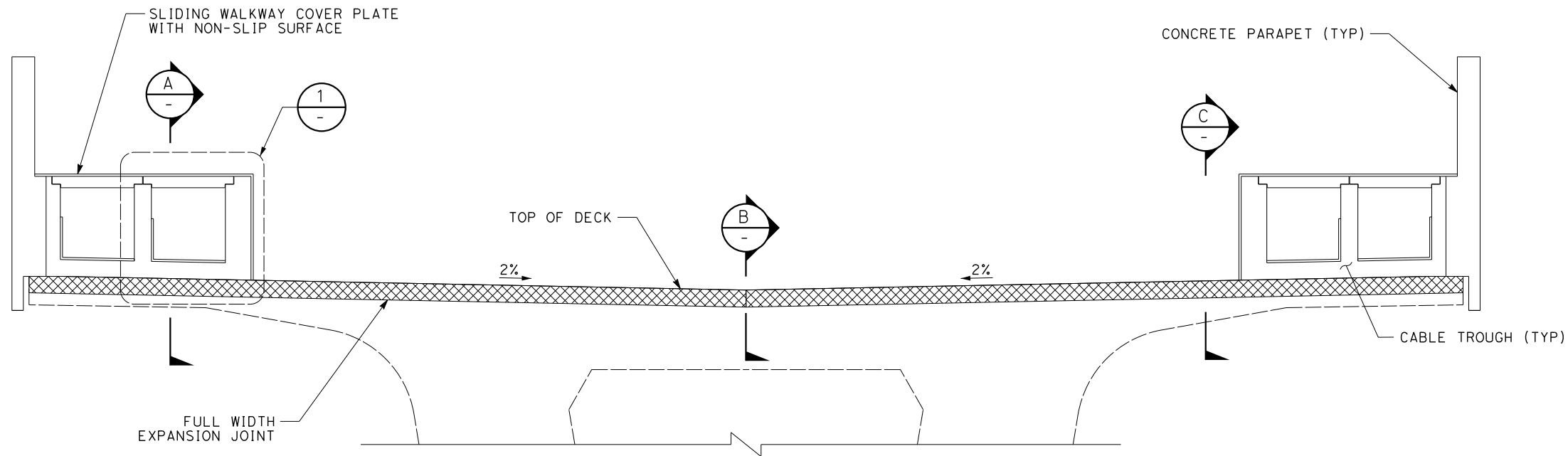
CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

**CALIFORNIA HIGH-SPEED TRAIN PROJECT
STRUCTURAL DIRECTIVE**

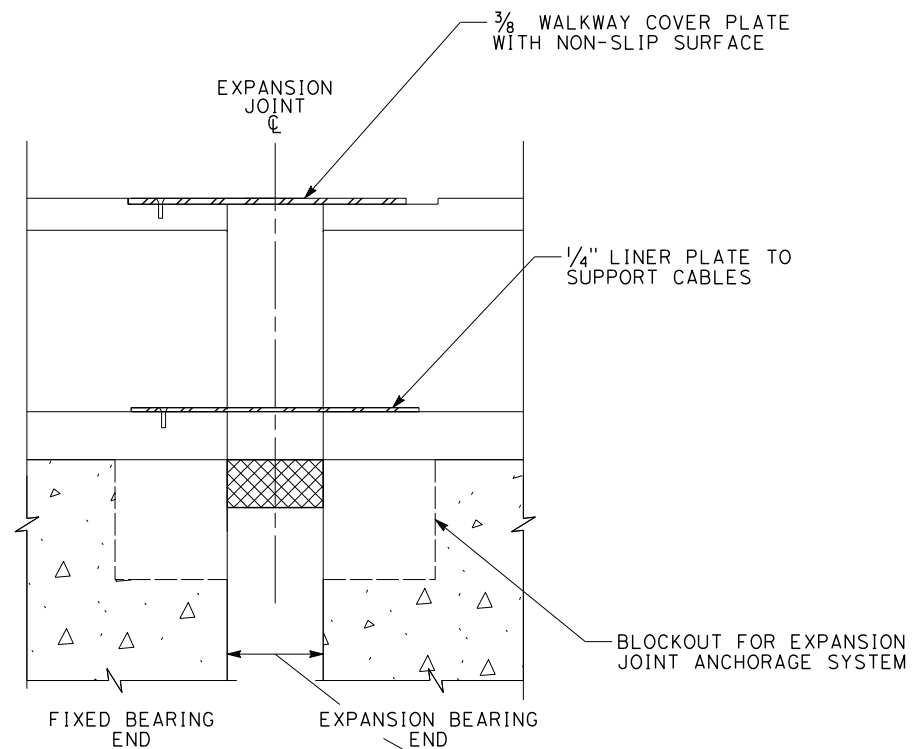
AERIAL STRUCTURE
TYPICAL SPAN
SHEAR KEY DETAILS

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| CONTRACT NO. |
| DRAWING NO. DD-ST-911 |
| SCALE AS SHOWN |
| SHEET NO. |

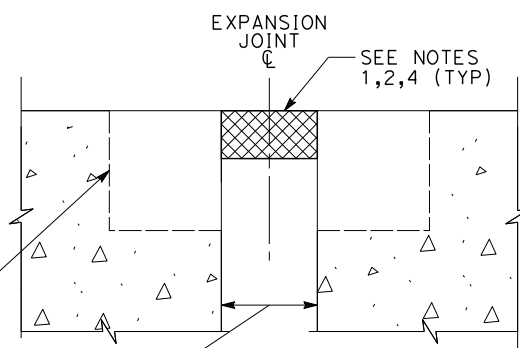
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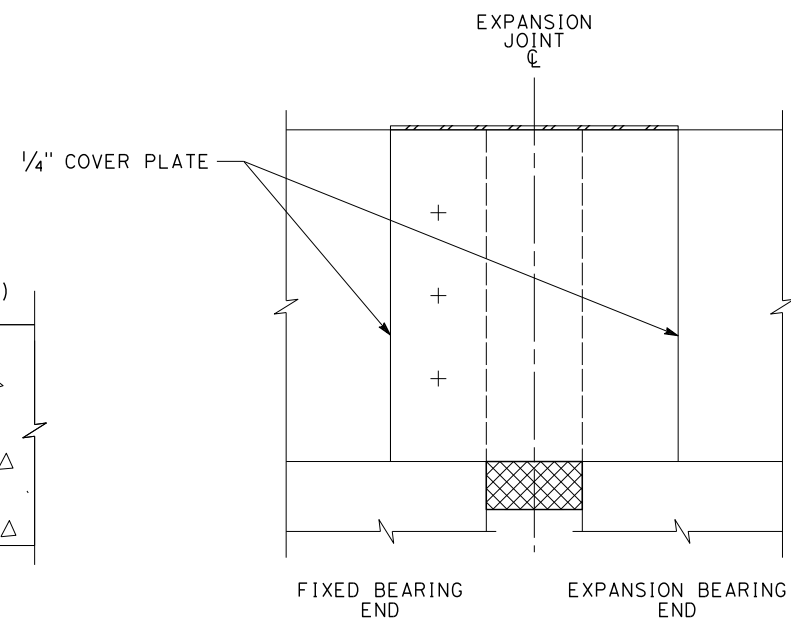
EXPANSION JOINT SECTION



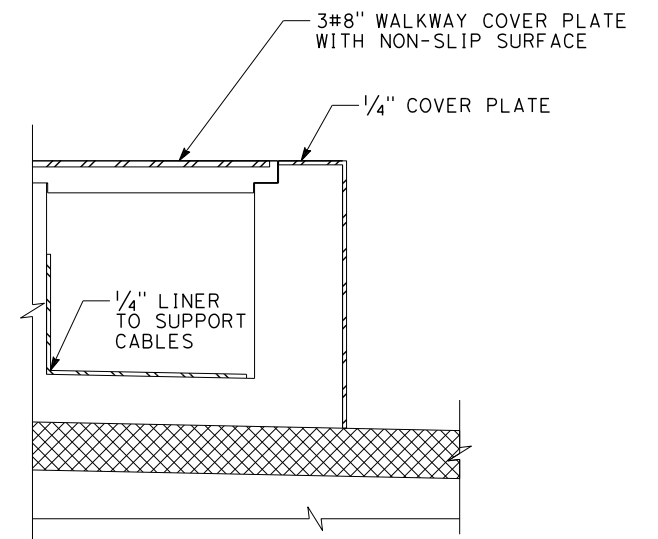
SECTION A



SECTION B



SECTION C



DETAIL 1

NOTES:

1. THE EXPANSION JOINT DETAILS SHOWN ARE FOR ILLUSTRATION ONLY. THE CONTRACTOR SHALL DEVELOP AN EXPANSION JOINT SYSTEM THAT CONFORMS TO THE REQUIREMENTS IN THE STRUCTURES CHAPTER OF THE DESIGN CRITERIA.
2. THE EXPANSION OPENING BETWEEN THE ENDS OF BRIDGE DECK AND ABUTMENT SHALL ACCOMMODATE THE MOVEMENT RANGE AS SPECIFIED.
3. EXPANSION JOINTS SHALL BE EASILY ACCESSIBLE FOR INSPECTION AND MAINTENANCE. EXPANSION JOINTS SHALL BE REPLACEABLE AT ANYTIME DURING THE LIFE OF STRUCTURES WITHOUT INTERFERENCE TO NORMAL TRAIN OPERATIONS.
4. THE EXPANSION JOINT SHALL BE WATERTIGHT.
5. ALL STRUCTURAL STEEL PLATES SHALL BE GALVANIZED.

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| DESIGNED BY P. LIN |
| DRAWN BY V. HUANTE |
| CHECKED BY K. PUGASAP |
| IN CHARGE G. LUSHEROVICH |
| DATE 01/24/2014 |

**PARSONS
BRINCKERHOFF**



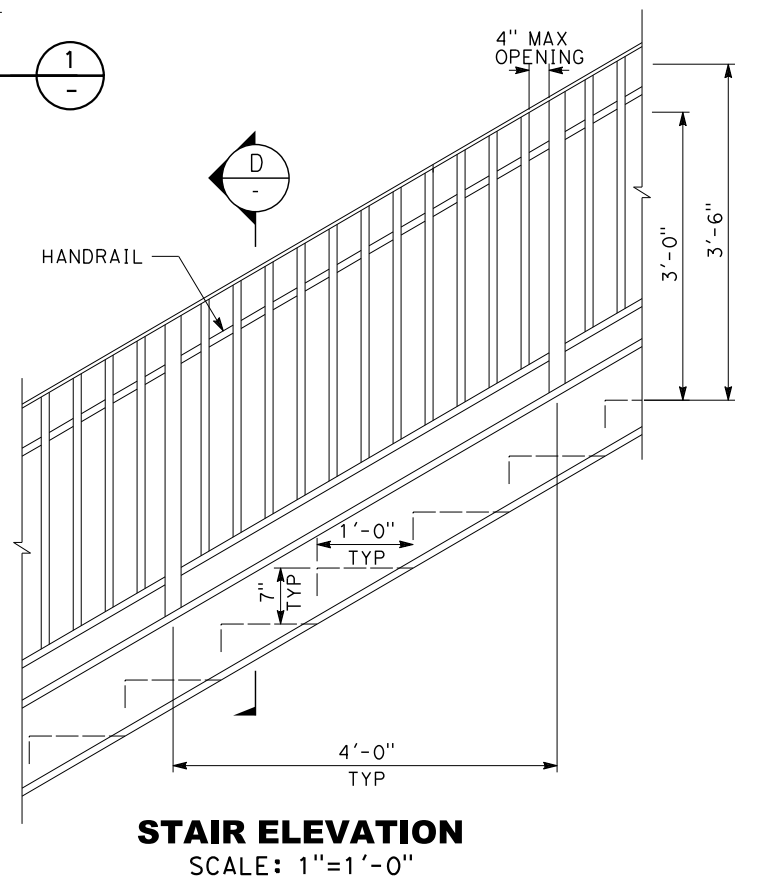
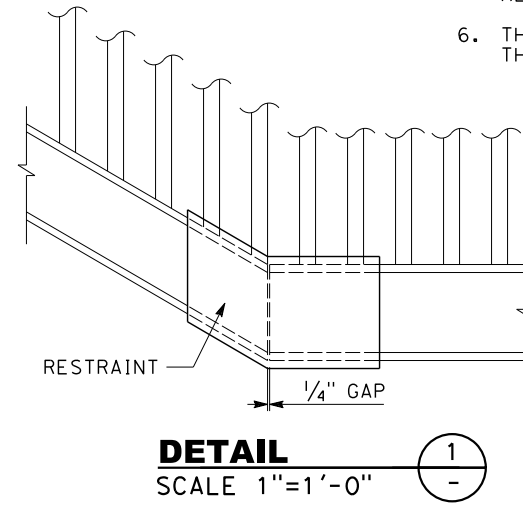
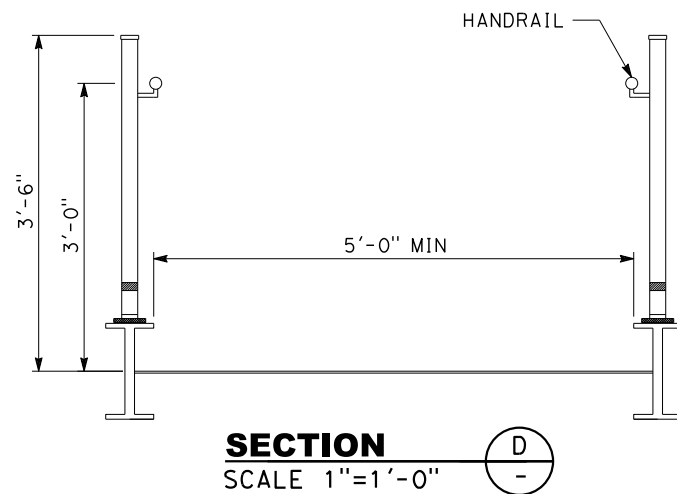
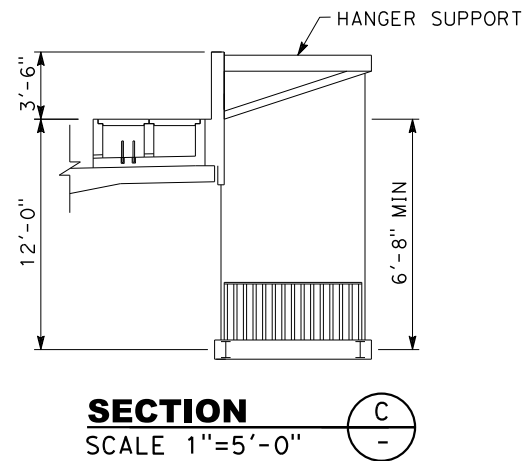
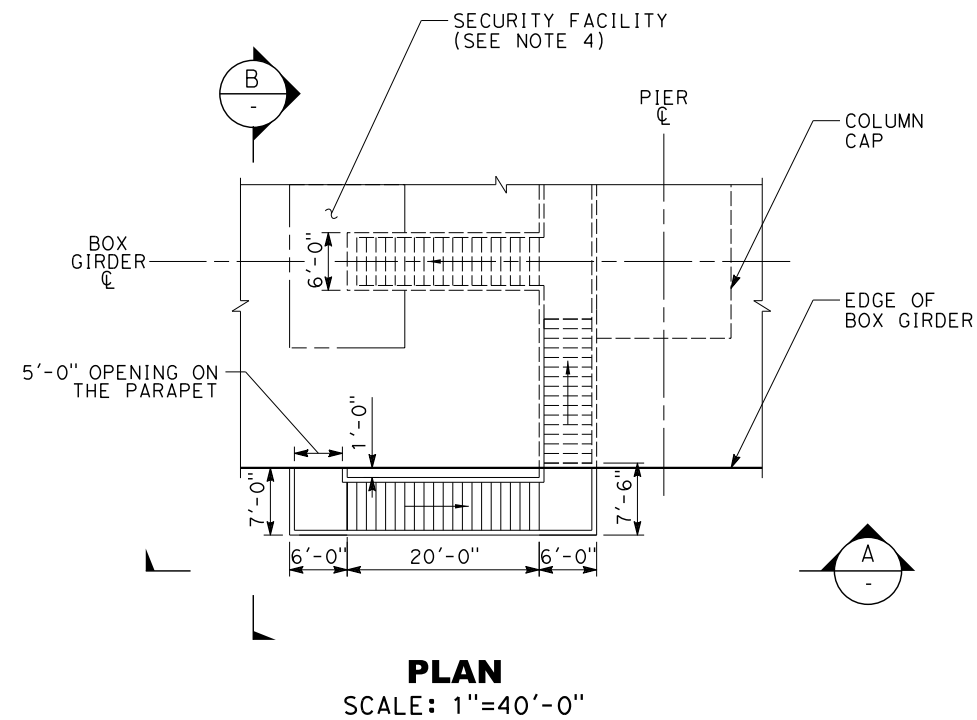
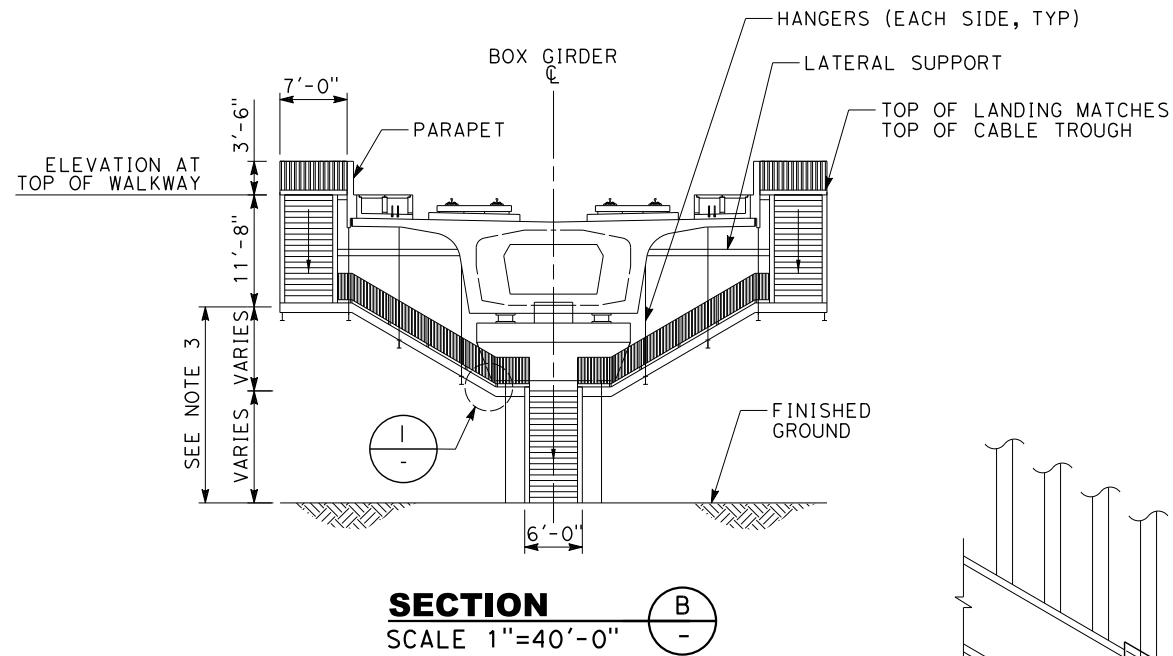
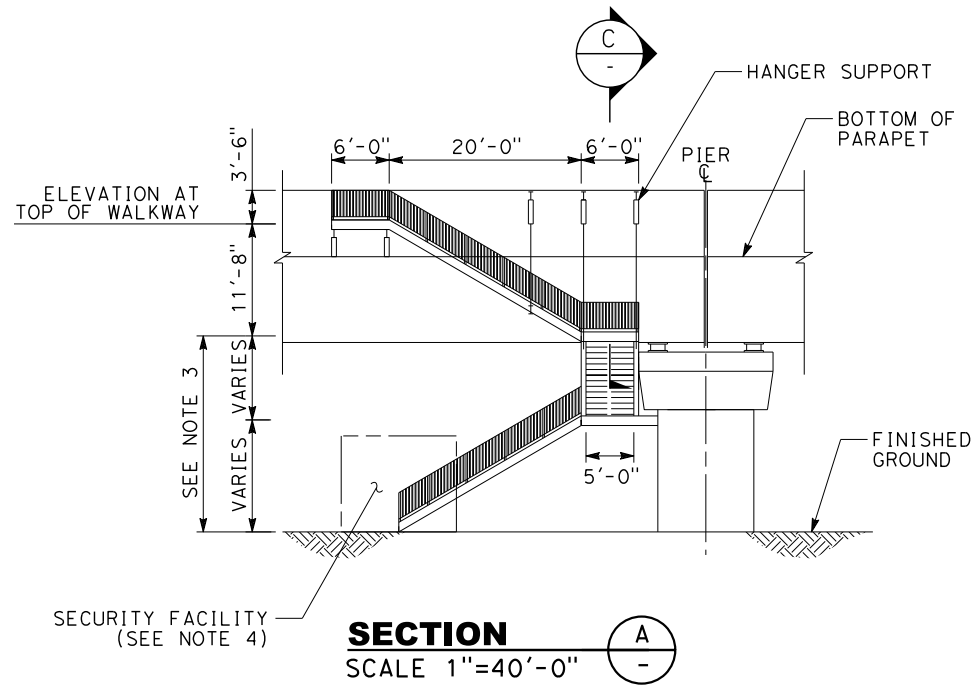
CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

**CALIFORNIA HIGH-SPEED TRAIN PROJECT
STRUCTURAL DIRECTIVE**

AERIAL STRUCTURE
TYPICAL SPAN
EXPANSION JOINT DETAILS

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| CONTRACT NO. |
| DRAWING NO. DD-ST-912 |
| SCALE NO SCALE |
| SHEET NO. |

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NOTES:

1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. THE STAIRWAY STRUCTURAL SYSTEM SHOWN IS FOR ILLUSTRATION ONLY. THE CONTRACTOR MAY DESIGN AN EQUIVALENT STAIRWAY SYSTEM TO FIT THE SITE CONDITION.
3. WHERE VERTICAL DISTANCE BETWEEN LANDING EXCEEDS 12'-0", INTERMEDIATE LANDINGS MUST BE PROVIDED.
4. THE DESIGN OF THE SECURITY FACILITY SHALL MEET THE REQUIREMENTS OF THE EMERGENCY ACCESS/EGRESS POINTS, AS SPECIFIED IN THE SYSTEM SAFETY AND SECURITY CHAPTER OF THE DESIGN CRITERIA.
5. THE ACCESS ROAD FROM THE GATE OF SECURITY FACILITY TO THE LOCAL ROAD SHALL BE PROVIDED. THE CONTRACTOR SHALL COORDINATE WITH THE PERTINENT AUTHORITIES FOR REQUIRED EASEMENT ALONG THE AERIAL STRUCTURES.
6. THE CONTRACTOR SHALL CONSIDER THE LOADS DUE TO THE STAIRWAY IN THE DESIGN OF AERIAL STRUCTURES.

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| DESIGNED BY P. LIN |
| DRAWN BY V. HUANTE |
| CHECKED BY K. PUGASAP |
| IN CHARGE G. LUSHEROVICH |
| DATE 01/24/2014 |

**PARSONS
BRINCKERHOFF**



CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

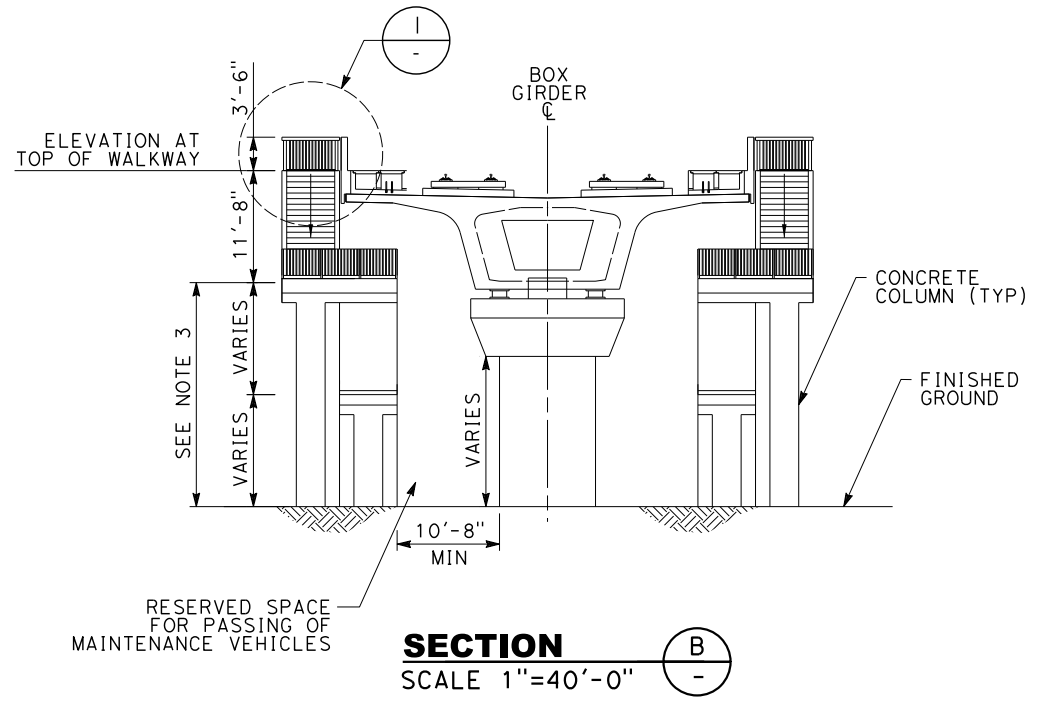
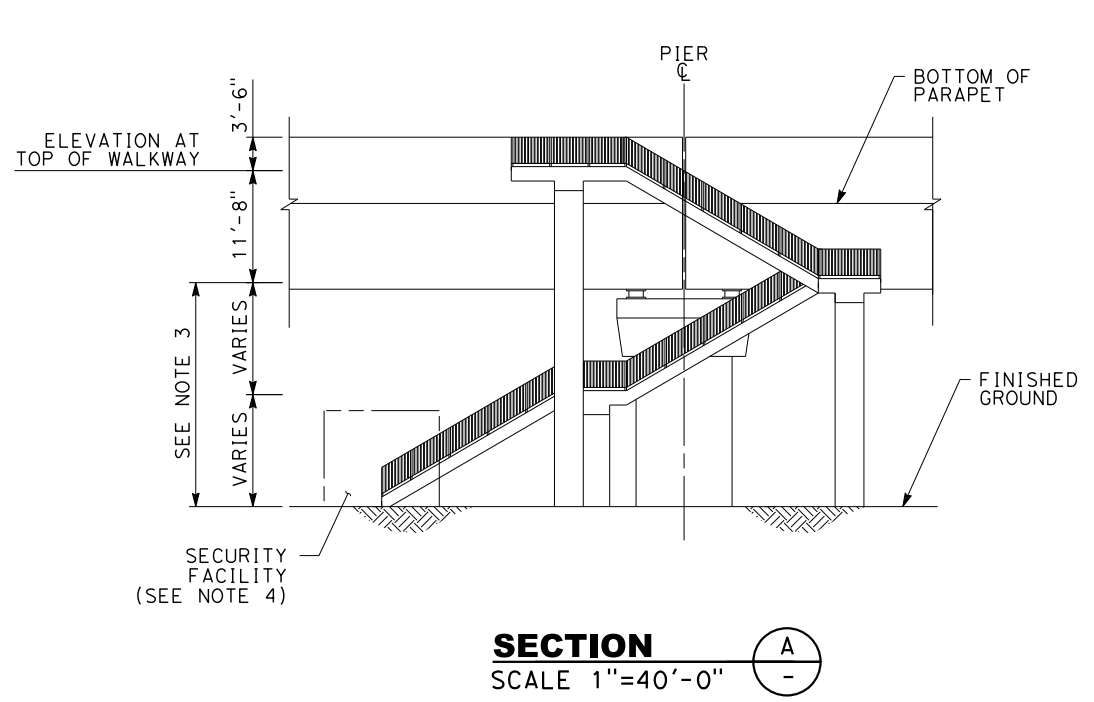
**CALIFORNIA HIGH-SPEED TRAIN PROJECT
STRUCTURAL DIRECTIVE**

AERIAL STRUCTURE
EMERGENCY EXIT STAIRWAY DETAILS 1

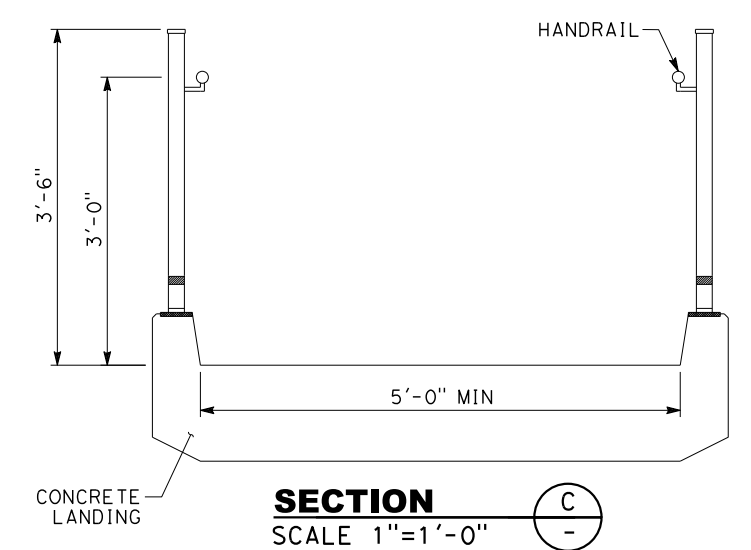
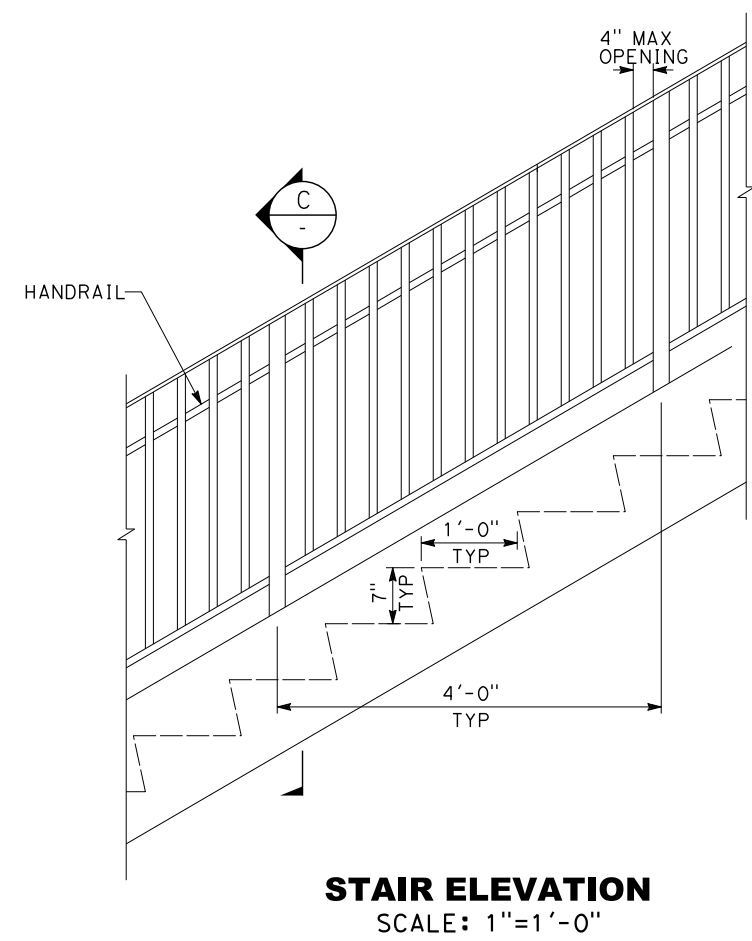
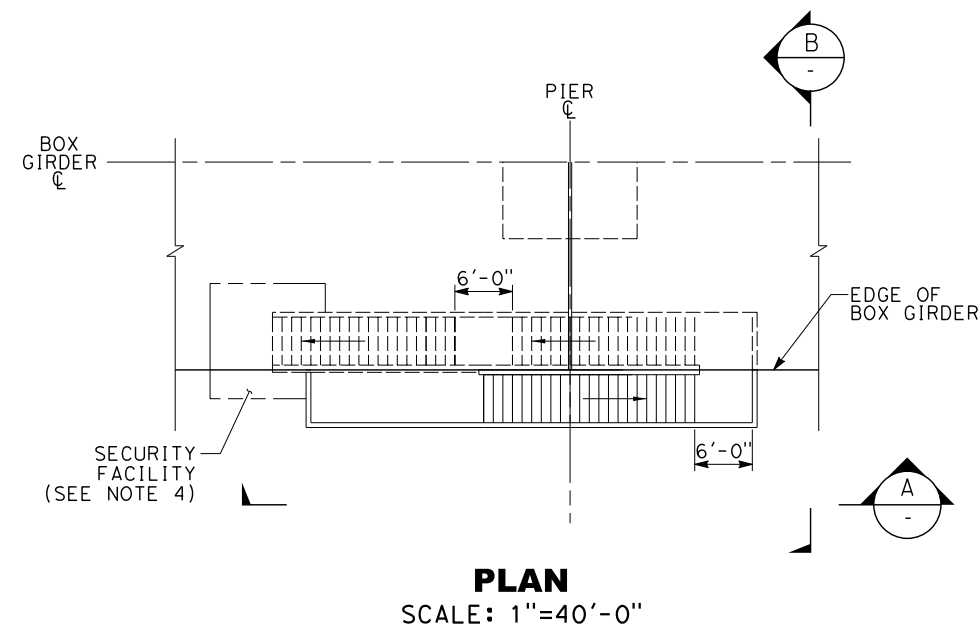
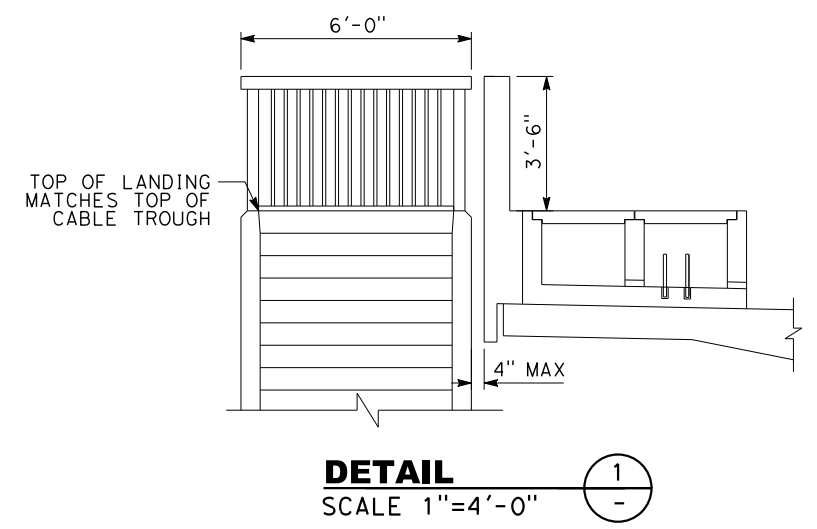
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| DRAWING NO. DD-ST-913 |
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04/02/2014 - RFP No.: HSR 13-57

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- NOTES:**
1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
 2. THE STAIRWAY STRUCTURAL SYSTEM SHOWN IS FOR ILLUSTRATION ONLY. THE CONTRACTOR MAY DESIGN AN EQUIVALENT STAIRWAY SYSTEM TO FIT THE SITE CONDITION.
 3. WHERE VERTICAL DISTANCE BETWEEN LANDING EXCEEDS 12'-0", INTERMEDIATE LANDINGS SHALL BE PROVIDED.
 4. THE DESIGN OF THE SECURITY FACILITY SHALL MEET THE REQUIREMENTS OF THE EMERGENCY ACCESS/EGRESS POINTS, AS SPECIFIED IN THE SYSTEM SAFETY AND SECURITY CHAPTER OF THE DESIGN CRITERIA.
 5. THE ACCESS ROAD FROM THE GATE OF SECURITY FACILITY TO THE LOCAL ROAD SHALL BE PROVIDED. THE CONTRACTOR SHALL COORDINATE WITH THE PERTINENT AUTHORITIES FOR REQUIRED EASEMENT ALONG THE AERIAL STRUCTURES.
 6. THE CONTRACTOR SHALL CONSIDER THE LOADS DUE TO THE STAIRWAY IN THE DESIGN OF AERIAL STRUCTURES.



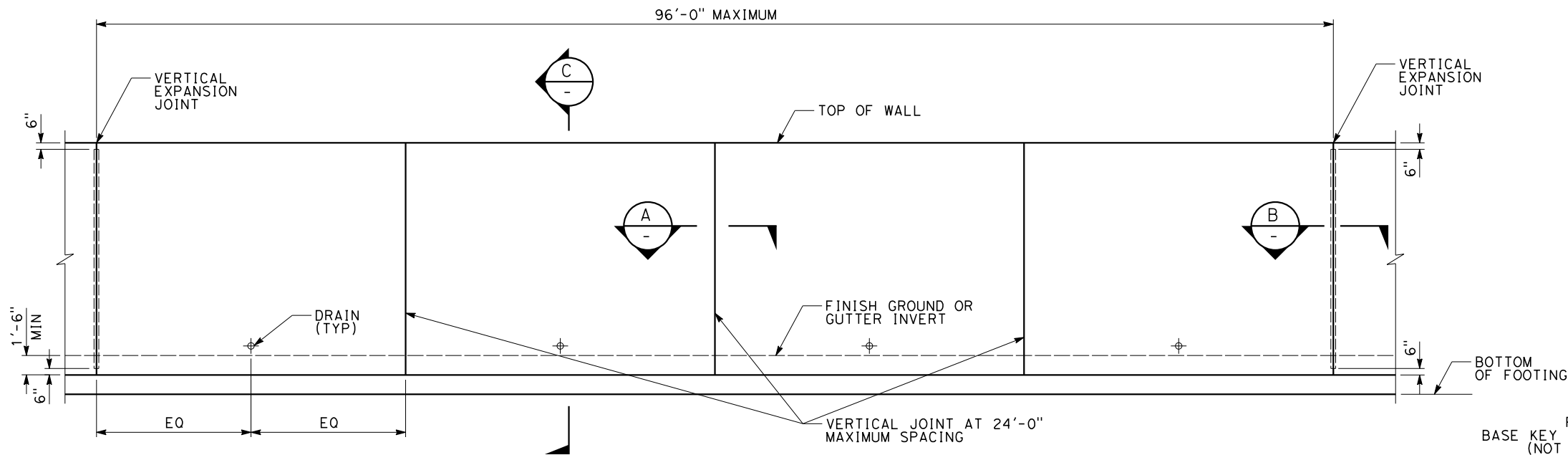
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| DESIGNED BY P. LIN |
| DRAWN BY V. HUANTE |
| CHECKED BY K. PUGASAP |
| IN CHARGE G. LUSHEROVICH |
| DATE 01/24/2014 |



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| CALIFORNIA HIGH-SPEED TRAIN PROJECT STRUCTURAL DIRECTIVE | | CONTRACT NO. |
| AERIAL STRUCTURE EMERGENCY EXIT STAIRWAY DETAILS 2 | | DRAWING NO. DD-ST-914 |
| | | SCALE AS SHOWN |
| | | SHEET NO. |

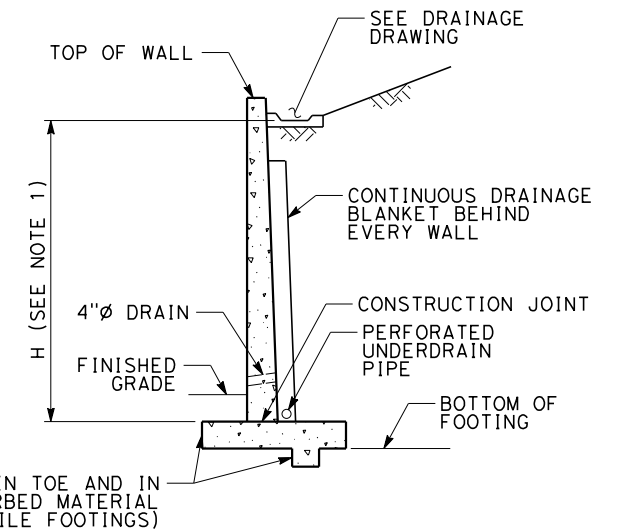
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RETAINING WALL ELEVATION

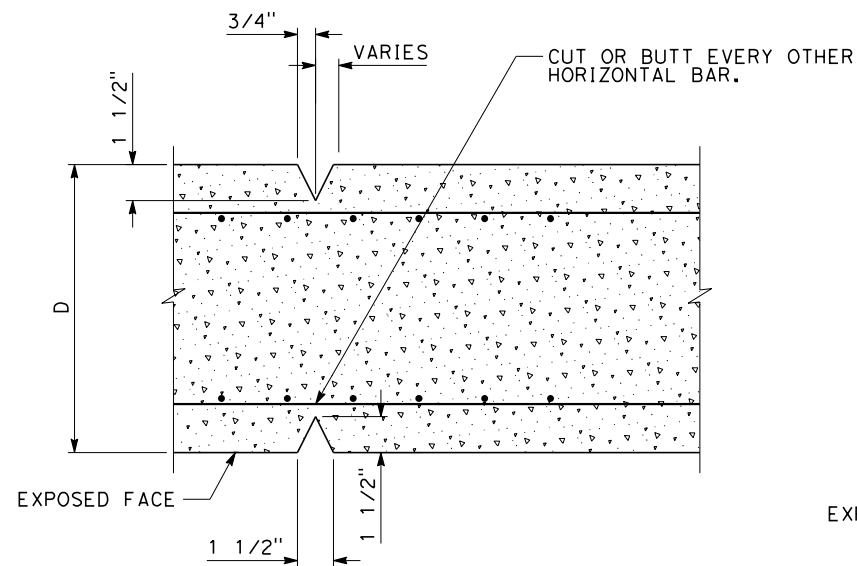
NOTES:

1. ELEVATION OF TOP OF WALL AND BOTTOM OF FOOTING SHALL BE AS SHOWN ON OTHER CONTRACT DRAWINGS, VALUES OF H ARE DESIGN HEIGHTS ONLY.
2. WALL OFFSET SHALL BE DETERMINED BY THE PROJECT STRUCTURAL ENGINEER IN CONSULTATION WITH THE PROJECT GEOTECHNICAL ENGINEER BASED ON THE CONSTRUCTION METHOD AND SEQUENCING AND IN ACCORDANCE WITH PROJECT DESIGN CRITERIA.
3. WHEN A RETAINING WALL IS USED AS A CUT WALL (INCLUDING TRENCH WALLS) ALL JOINTS INCLUDING THE WEAKENED PLANE JOINTS SHALL CONTAIN A WATER STOP.



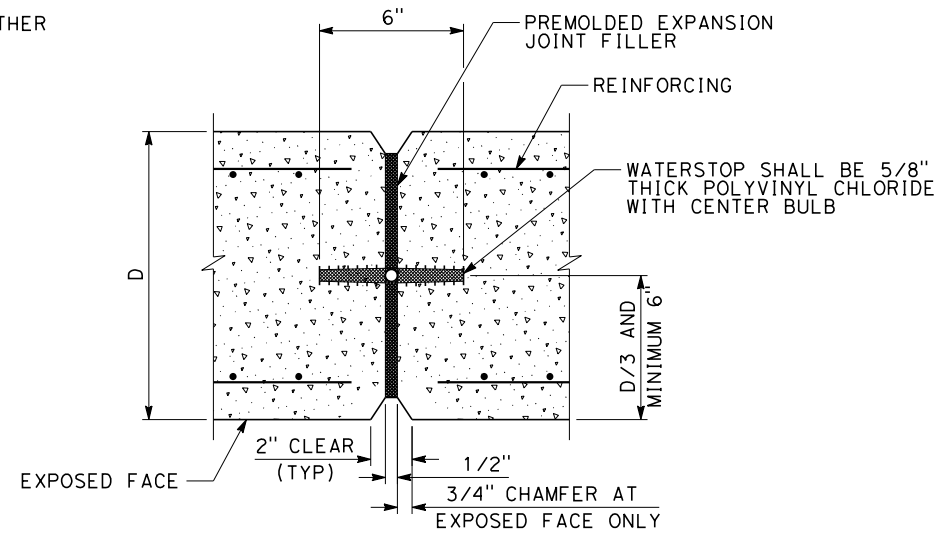
PLACE CONCRETE IN TOE AND IN BASE KEY AGAINST UNDISTURBED MATERIAL (NOT REQUIRED WITH PILE FOOTINGS)

TYPICAL SECTION

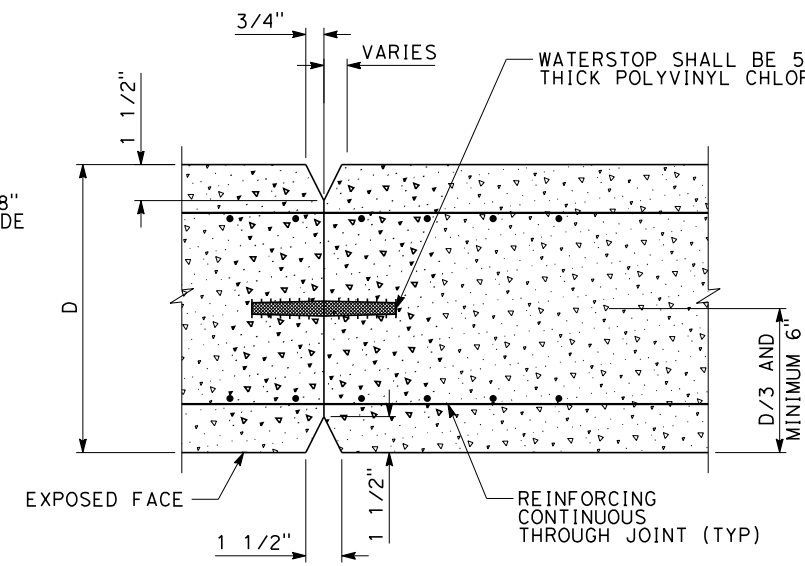


TYPICAL WEAKEND PLANE JOINT

(SEE NOTE 3)

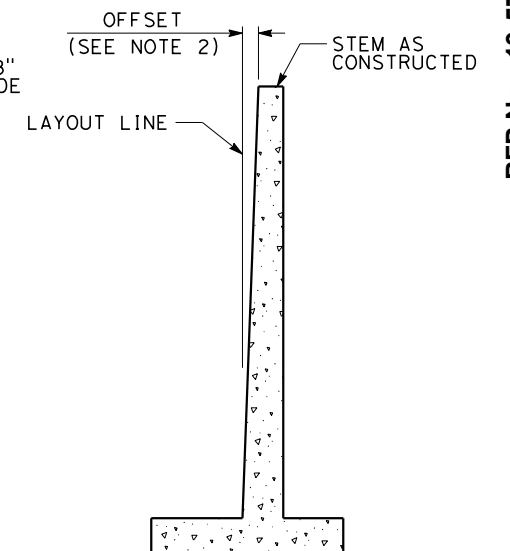


TYPICAL EXPANSION JOINT



TYPICAL CONSTRUCTION JOINT

LOCATE AS REQUIRED TO SUITE CONSTRUCTION SEQUENCE



WALL OFFSET VALUES

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| DESIGNED BY B. VALENTI |
| DRAWN BY V. LAVERDE |
| CHECKED BY P. LIN |
| IN CHARGE G. LUSHEROVICH |
| DATE 08/29/2014 |

PARSONS
BRINCKERHOFF



CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
STRUCTURAL DIRECTIVE

RETAINING WALL
LAYOUT AND DETAILS

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| CONTRACT NO. |
| DRAWING NO. DD-ST-920 |
| SCALE NO SCALE |
| SHEET NO. |

California High-Speed Rail Authority



RFP No.: HSR 13-57

**Request for Proposals for Design-Build
Services for Construction Package 2-3**

**Book III, Part B.1
Directive Drawings**

System Overall

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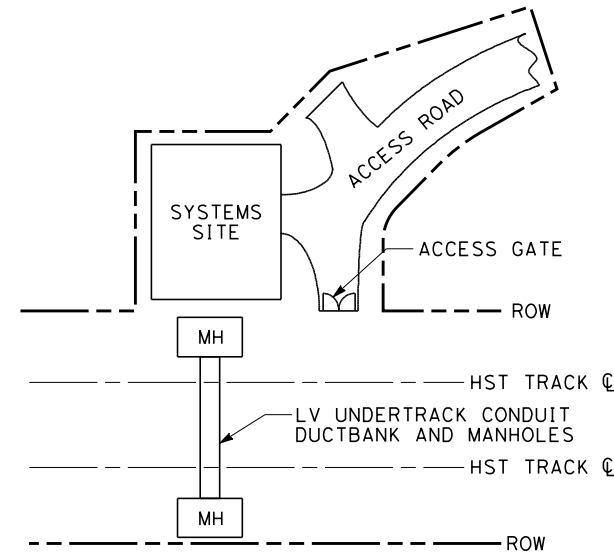


DIAGRAM A
AT-GRADE LOW-VOLTAGE UNDERTRACK
CONDUIT DUCTBANK, ACCESS ROADS AND
GATES AT SYSTEMS SITE

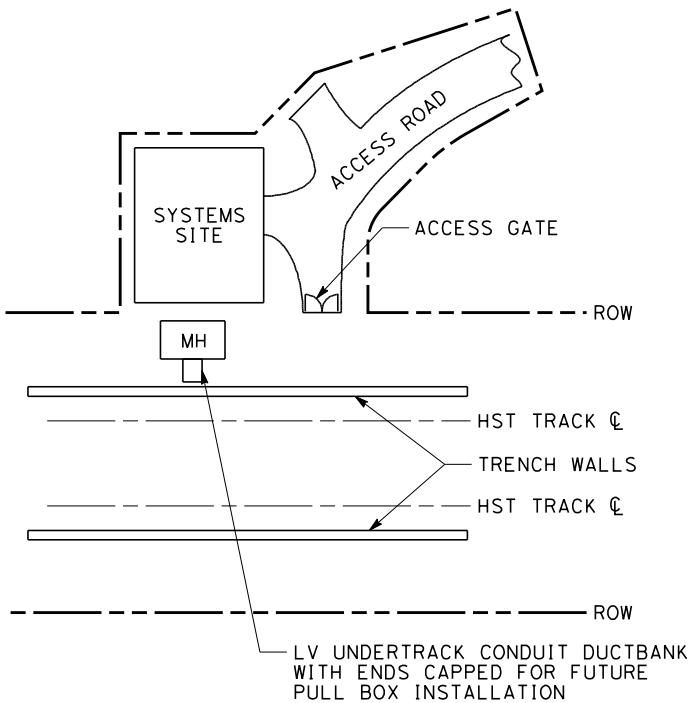


DIAGRAM B
TRENCH LOW-VOLTAGE UNDERTRACK
CONDUIT DUCT BANK AND ACCESS ROADS
AND GATES AT SYSTEMS SITE

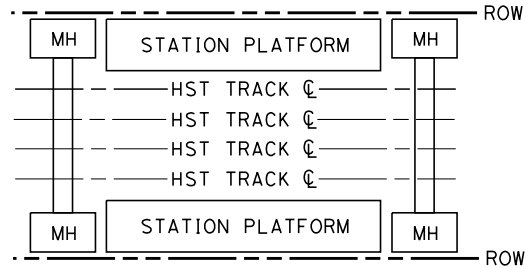


DIAGRAM C
LOW-VOLTAGE UNDERTRACK
DUCTBANK AT STATION PLATFORMS

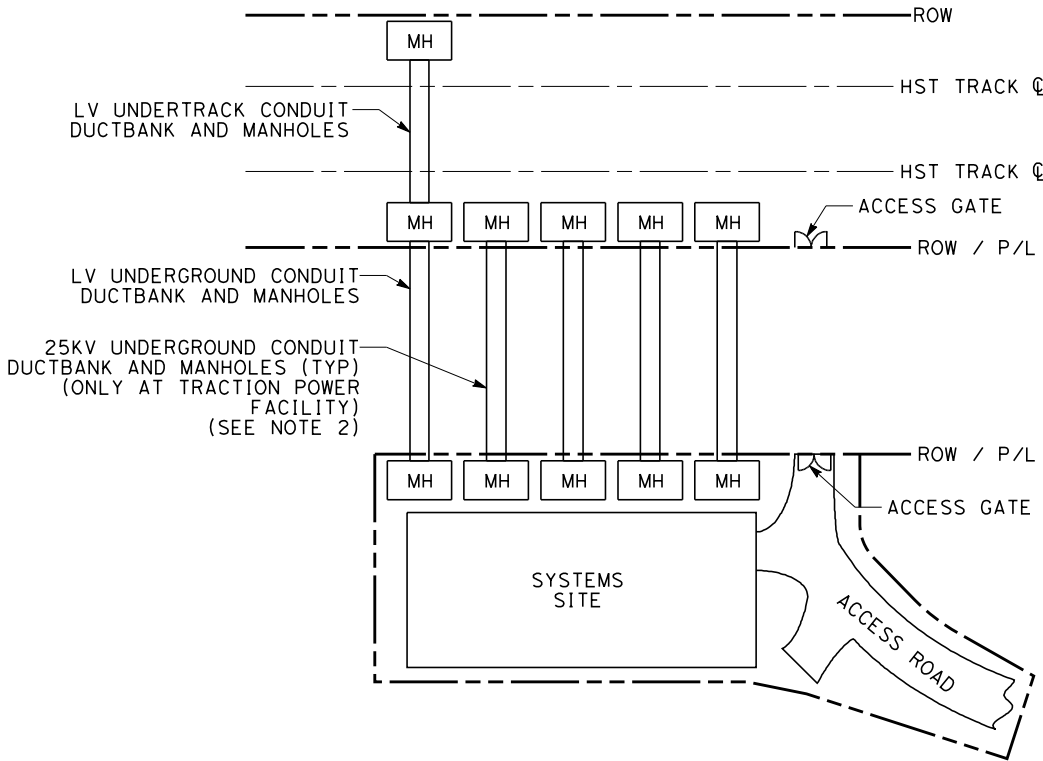


DIAGRAM C
AT-GRADE LOW-VOLTAGE UNDERTRACK AND UNDERGROUND
CONDUIT DUCT BANK, 25KV UNDERGROUND CONDUIT DUCT
BANK, ACCESS ROADS AND GATES AT SYSTEMS SITE
LOCATED AWAY FROM HSR ROW

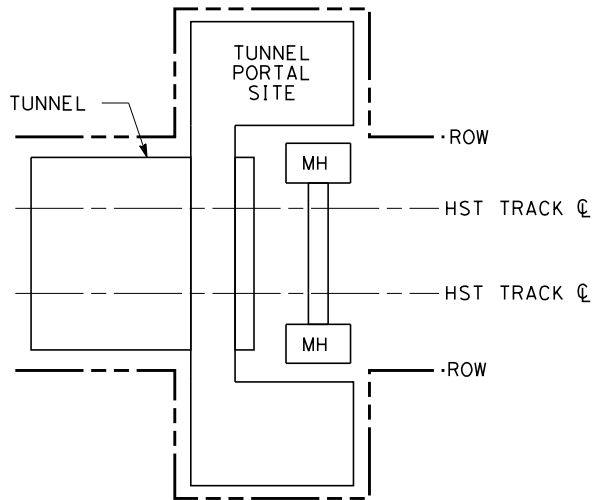


DIAGRAM E
AT-GRADE LOW-VOLTAGE
UNDERTRACK CONDUIT DUCTBANK
AT TUNNEL PORTAL SITES

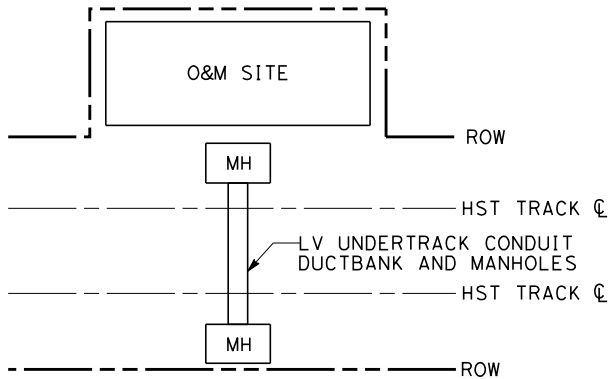


DIAGRAM F
AT-GRADE LOW-VOLTAGE UNDERTRACK
CONDUIT DUCTBANK AT O&M FACILITIES
UNDIVIDED

- NOTES:**
1. SYSTEM SITES INCLUDE TRACTION POWER FACILITIES, TRAIN CONTROL HOUSES, STANDALONE RADIO SITES.
 2. TYPICALLY THERE ARE FOUR 25KV UNDERGROUND CONDUIT DUCTBANKS AND ACCOMPANYING MANHOLES PER TRACTION POWER SITE.
 3. ACCESS ROADS AND ACCESS GATES ARE SHOWN FOR INFORMATION ONLY. CONSULT CIVIL DESIGN CRITERIA AND PRELIMINARY DESIGN PLANS FOR REQUIREMENTS AND DETAILS.
 4. SEE TRACTION POWER AND COMMUNICATIONS DRAWINGS FOR DUCTBANK, MANHOLE CROSS SECTIONS, DETAILS AND ELEVATIONS.
 5. FOR NUMBERS OF CONDUITS SEE COMMUNICATION DESIGN CRITERIA AND DRAWING "TYPICAL CROSS SECTION SYSTEMS LOW-VOLTAGE CONDUIT DUCTBANK".
 6. INTERMEDIATE MANHOLES TO BE INCLUDED BASED UPON APPLICABLE STANDARDS, REGULATIONS AND CODES.

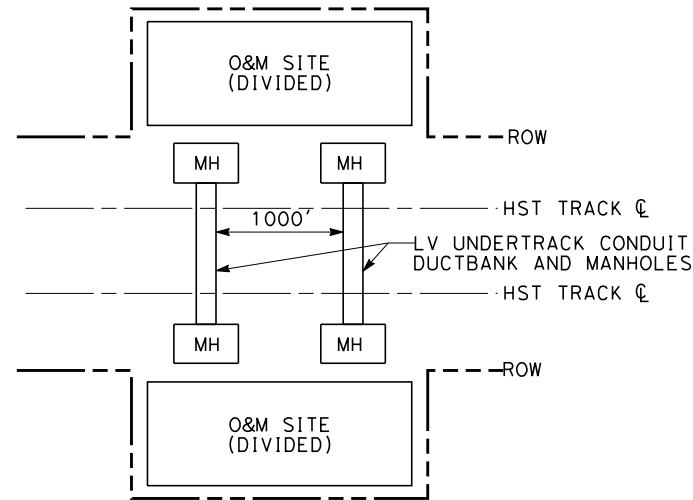


DIAGRAM G
AT-GRADE LOW-VOLTAGE UNDERTRACK
CONDUIT DUCTBANK AT O&M FACILITIES
DIVIDED BY MAINLINE TRACK

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| A | 05/31/13 | | | | EXECUTION VERSION |
| REV | DATE | BY | CHK | APP | DESCRIPTION |

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| DESIGNED BY B. BANKS |
| DRAWN BY V. HUANTE |
| CHECKED BY C. DALOIA |
| IN CHARGE R. SCHMEDES |
| DATE 11/19/2013 |

**PARSONS
BRINCKERHOFF**



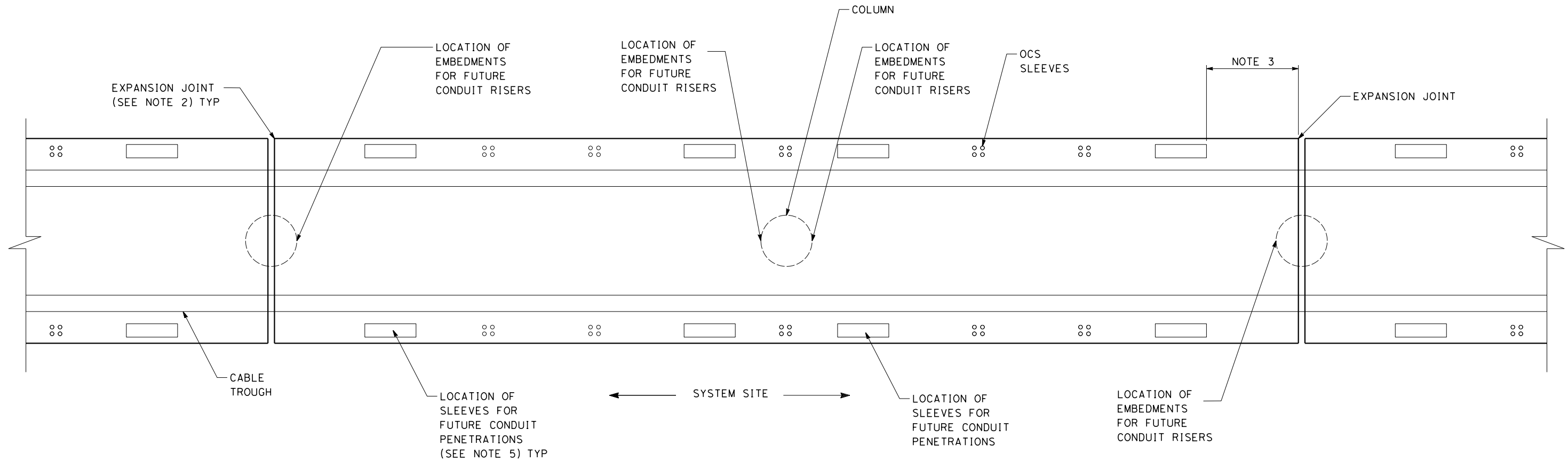
CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

**CALIFORNIA HIGH-SPEED TRAIN PROJECT
SYSTEMS DIRECTIVE**

TYPICAL CIVIL ACCOMMODATIONS FOR SYSTEMS
AT SYSTEM SITES, STATIONS,
TUNNEL PORTAL FACILITIES AND O&M FACILITIES

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| CONTRACT NO. |
| DRAWING NO. DD-SY-010 |
| SCALE NO SCALE |
| SHEET NO. |

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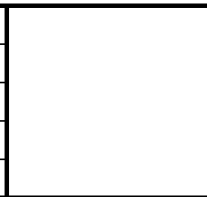
PLAN

NOTES:

1. STRUCTURAL DESIGN DETAILS, CABLE TROUGH AND OCS SLEEVES SHOWN HERE ARE SCHEMATIC ONLY.
2. SLEEVE PENETRATION LOCATIONS SHALL BE LOCATED NOMINALLY $10\frac{3}{32}$ FROM THE EXPANSION JOINT.
3. SLEEVE PENETRATION LOCATIONS FOR FUTURE CONDUIT PENETRATIONS SHALL BE PROVIDED IN LINE WITH THE OCS POLE FOUNDATIONS.
4. FOR EACH SLEEVE PENETRATION, AREA SHALL BE SIZED TO HOUSE 10 TRADE SIZE 4 CONDUITS.
5. FOR CONDUIT RISER EMBEDMENTS AND PENETRATIONS ON AERIAL STRUCTURE REQUIREMENTS, REFER TO STRUCTURES CHAPTER OF THE DESIGN CRITERIA. PENETRATIONS SHALL BE PLACED AT THE NEAREST 3 COLUMNS TO THE SYSTEMS SITE OR FACILITY AS SHOWN.

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| DESIGNED BY G. SPADAFORE |
| DRAWN BY V. LAVERDE |
| CHECKED BY B. MCNALLY |
| IN CHARGE B. BANKS |
| DATE 8/29/2014 |



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| CALIFORNIA HIGH-SPEED TRAIN PROJECT TRAIN CONTROL DIRECTIVE |
| SYSTEMS SITE LOCATION AT AERIAL STRUCTURE EMBEDMENTS AND KNOCKOUTS |

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| CONTRACT NO. |
| DRAWING NO. DD-SY-030 |
| SCALE NO SCALE |
| SHEET NO. |

California High-Speed Rail Authority



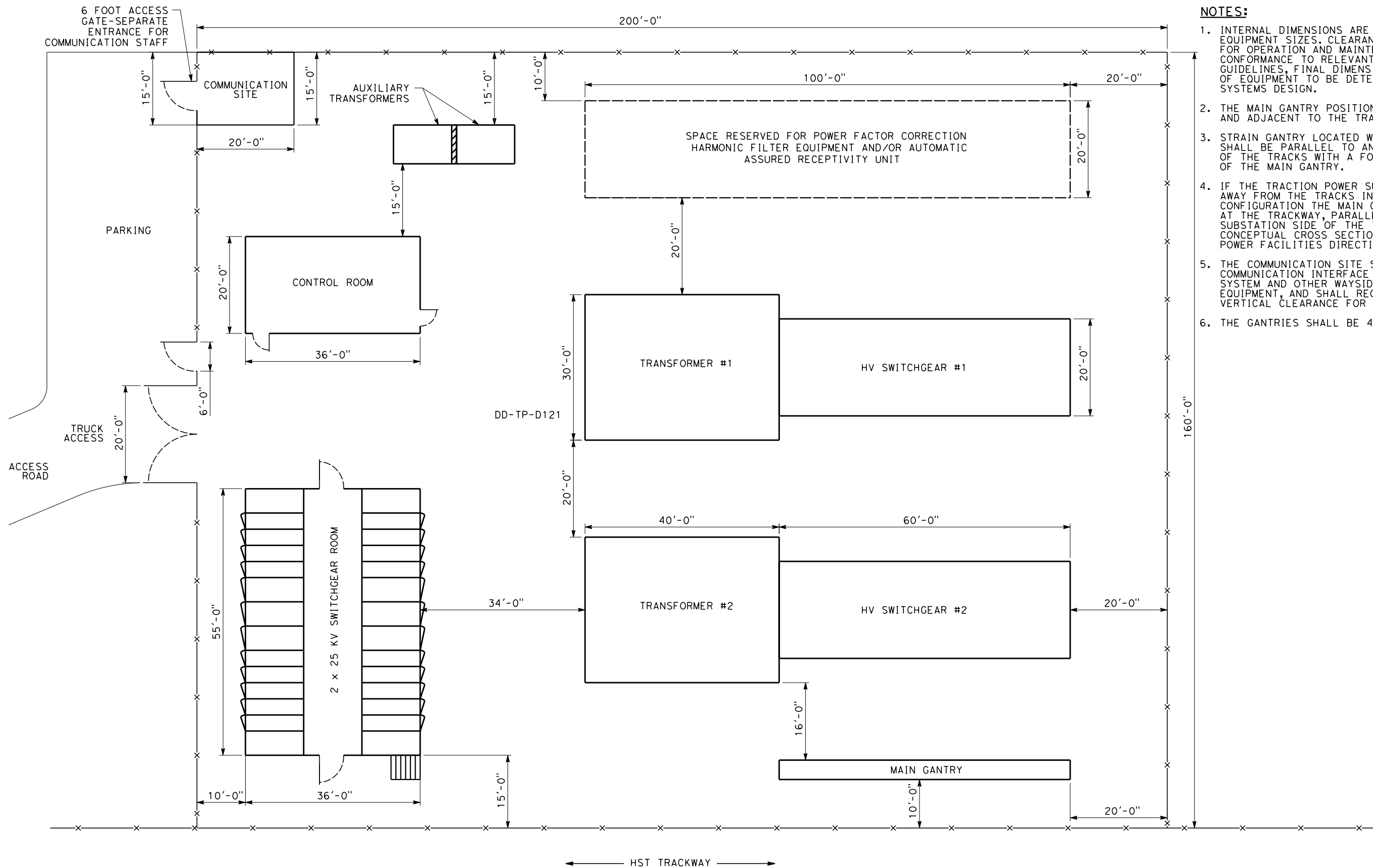
RFP No.: HSR 13-57

**Request for Proposals for Design-Build
Services for Construction Package 2-3**

**Book III, Part B.1
Directive Drawings**

Traction Power

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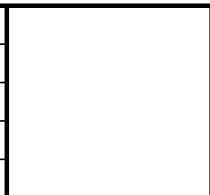


NOTES:

1. INTERNAL DIMENSIONS ARE SHOWN FOR TYPICAL EQUIPMENT SIZES. CLEARANCES AND ACCESSIBILITY FOR OPERATION AND MAINTENANCE OF EQUIPMENT AND CONFORMANCE TO RELEVANT CODES, STANDARDS, AND GUIDELINES, FINAL DIMENSIONS AND CONFIGURATION OF EQUIPMENT TO BE DETERMINED DURING FINAL SYSTEMS DESIGN.
2. THE MAIN GANTRY POSITION SHALL BE PARALLEL TO AND ADJACENT TO THE TRACKWAY.
3. STRAIN GANTRY LOCATED WITHIN THE RIGHT-OF-WAY, SHALL BE PARALLEL TO AND ON THE OPPOSITE SIDE OF THE TRACKS WITH A FOOTPRINT EQUAL TO THAT OF THE MAIN GANTRY.
4. IF THE TRACTION POWER SUBSTATION IS LOCATED AWAY FROM THE TRACKS IN AN UNDESIRABLE CONFIGURATION THE MAIN GANTRY SHALL BE LOCATED AT THE TRACKWAY, PARALLEL TO AND TOWARDS SUBSTATION SIDE OF THE TRACKS. REFER TO CONCEPTUAL CROSS SECTIONS OF AWAY TRACTION POWER FACILITIES DIRECTIVE DRAWINGS.
5. THE COMMUNICATION SITE SHALL HOUSE COMMUNICATION INTERFACE EQUIPMENT FOR SCADA SYSTEM AND OTHER WAYSIDE COMMUNICATION EQUIPMENT, AND SHALL REQUIRE MINIMUM 100' VERTICAL CLEARANCE FOR RADIO TOWER.
6. THE GANTRIES SHALL BE 40 FEET HIGH (TYP).

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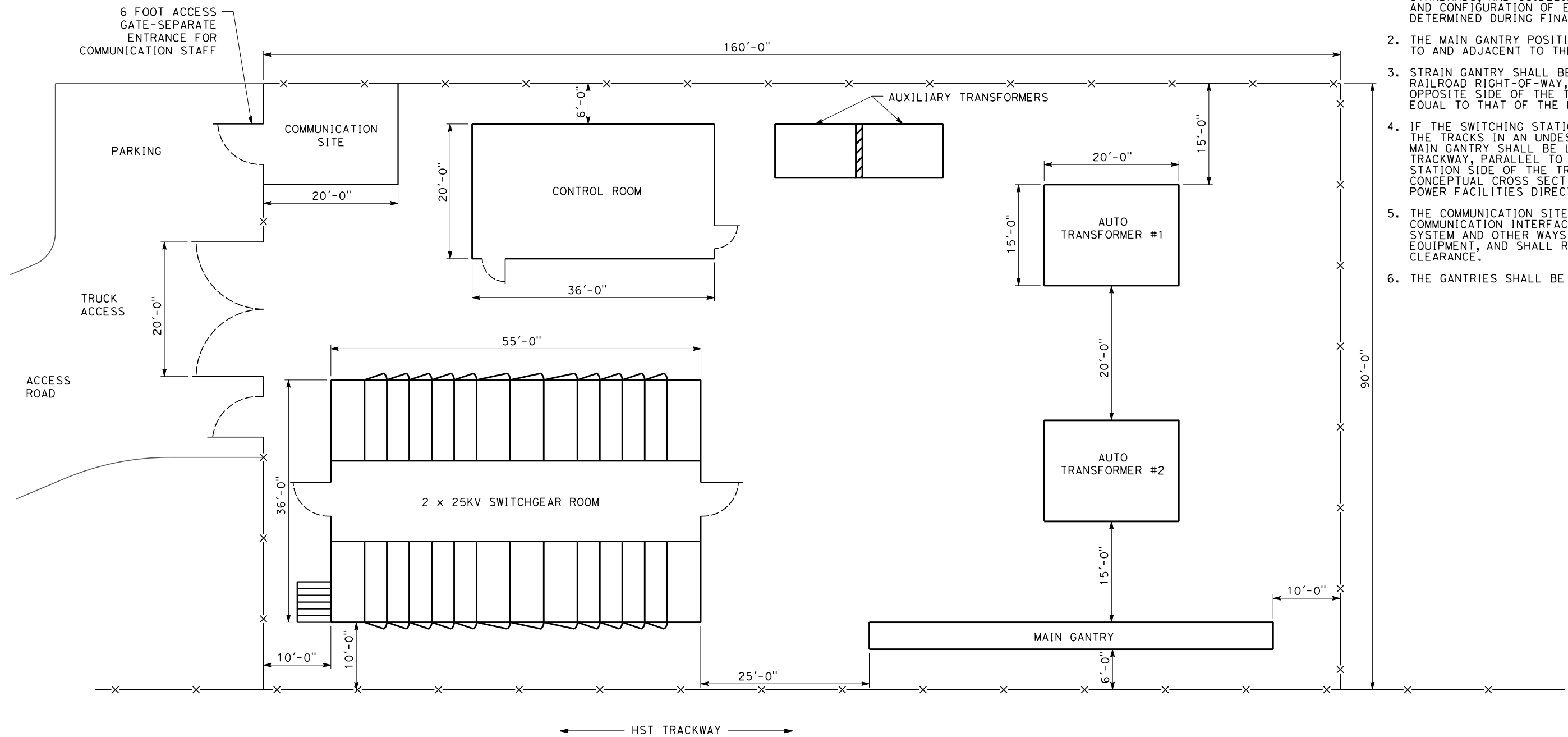
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| DESIGNED BY M. PAZ |
| DRAWN BY V. HUANTE |
| CHECKED BY V. SIBAL |
| IN CHARGE B. BANKS |
| DATE 8/29/2014 |



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| CALIFORNIA HIGH-SPEED TRAIN PROJECT |
| TRACTION POWER DIRECTIVE |
| CONCEPTUAL LAYOUT |
| TRACTION POWER SUBSTATION |
| WITH TWO HIGH-VOLTAGE TRANSFORMERS |

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| CONTRACT NO. |
| DRAWING NO. DD-TP-D101 |
| SCALE NO SCALE |
| SHEET NO. |

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NOTES:

1. INTERNAL DIMENSIONS ARE SHOWN FOR TYPICAL EQUIPMENT SIZES. CLEARANCES AND ACCESSIBILITY FOR OPERATION AND MAINTENANCE OF EQUIPMENT AND CONFORMANCE TO RELEVANT CODES, STANDARDS, AND GUIDELINES, FINAL DIMENSIONS AND CONFIGURATION OF EQUIPMENT TO BE DETERMINED DURING FINAL SYSTEMS DESIGN.
2. THE MAIN GANTRY POSITION SHALL BE PARALLEL TO AND ADJACENT TO THE TRACKS.
3. STRAIN GANTRY SHALL BE LOCATED WITHIN THE RAILROAD RIGHT-OF-WAY, PARALLEL TO AND ON THE OPPOSITE SIDE OF THE TRACKS WITH A FOOTPRINT EQUAL TO THAT OF THE MAIN GANTRY.
4. IF THE SWITCHING STATION IS LOCATED AWAY FROM THE TRACKS IN AN UNDESIRABLE CONFIGURATION, THE MAIN GANTRY SHALL BE LOCATED AT THE TRACKWAY, PARALLEL TO AND TOWARDS SWITCH STATION SIDE OF THE TRACKS. REFER TO CONCEPTUAL CROSS SECTIONS OF AWAY TRACTION POWER FACILITIES DIRECTIVE DRAWINGS.
5. THE COMMUNICATION SITE SHALL HOUSE COMMUNICATION INTERFACE EQUIPMENT FOR SCADA SYSTEM AND OTHER WAYSIDE COMMUNICATION EQUIPMENT, AND SHALL REQUIRE 100' VERTICAL CLEARANCE.
6. THE GANTRIES SHALL BE 40 FEET HIGH (TYP).

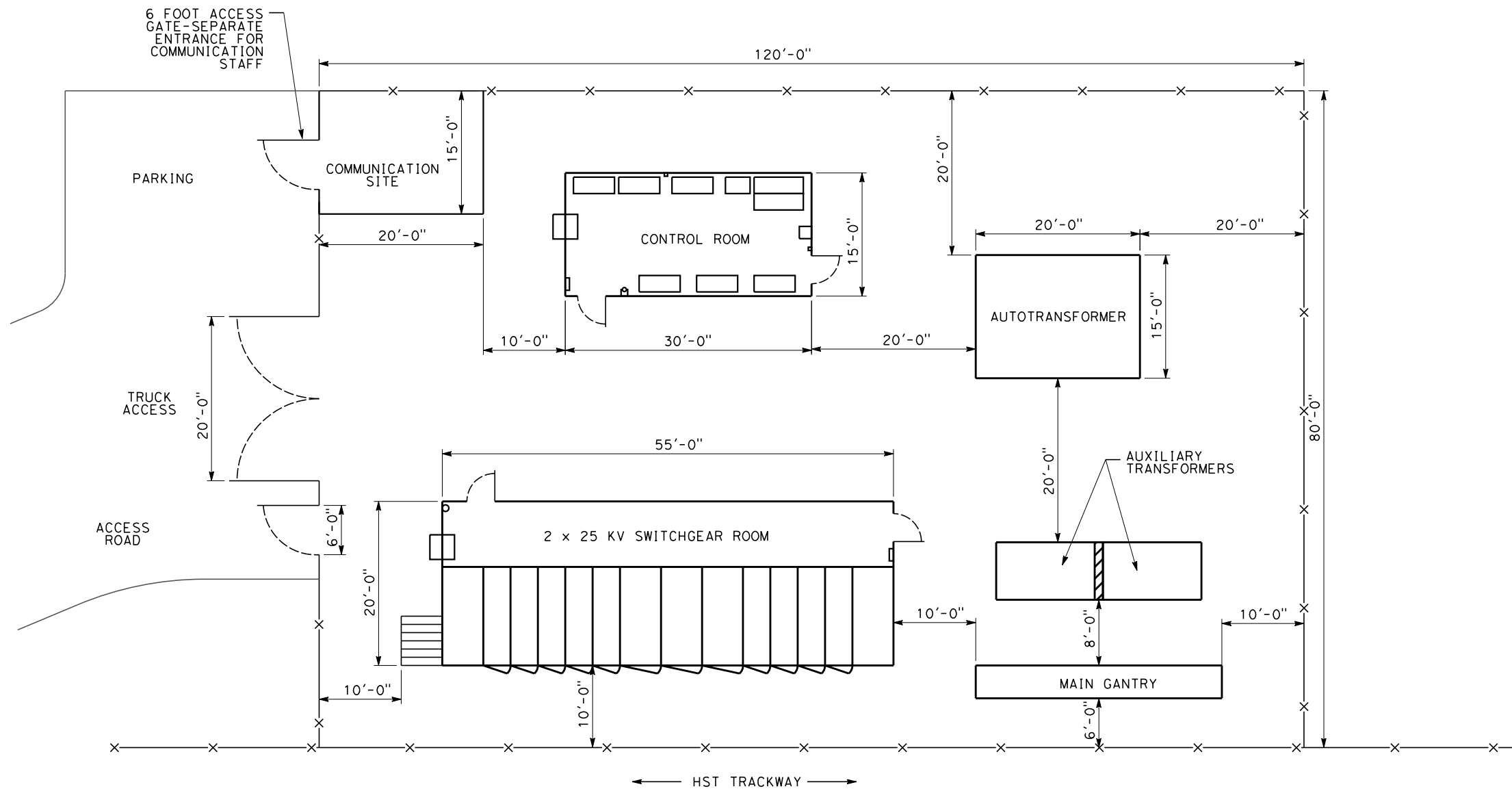
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| DESIGNED BY M. PAZ |
| DRAWN BY V. HUANTE |
| CHECKED BY V. SIBAL |
| IN CHARGE B. BANKS |
| DATE 8/29/2014 |



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| CALIFORNIA HIGH-SPEED TRAIN PROJECT TRACTION POWER DIRECTIVE | | CONTRACT NO. |
| CONCEPTUAL LAYOUT SWITCHING STATION | | DRAWING NO. DD-TP-D201 |
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NOTES:

1. INTERNAL DIMENSIONS ARE SHOWN FOR TYPICAL EQUIPMENT SIZES. CLEARANCES AND ACCESSIBILITY FOR OPERATION AND MAINTENANCE OF EQUIPMENT CONFORMANCE TO RELEVANT CODES, STANDARDS, AND GUIDELINES, FINAL DIMENSIONS AND CONFIGURATION OF EQUIPMENT TO BE DETERMINED DURING FINAL SYSTEMS DESIGN.
2. THE MAIN GANTRY POSITION SHALL BE PARALLEL TO AND ADJACENT TO THE TRACKS.
3. STRAIN GANTRY SHALL BE LOCATED WITHIN THE RAILROAD RIGHT-OF-WAY, PARALLEL TO AND ON THE OPPOSITE SIDE OF THE TRACKS WITH FOOTPRINT EQUAL TO THAT OF THE MAIN GANTRY.
4. IF THE PARALLELING STATION (PS) IS LOCATED AWAY FROM THE TRACKS IN AN UNDESIRABLE CONFIGURATION, THE MAIN GANTRY SHALL BE LOCATED AT THE TRACKWAY, PARALLEL TO AND TOWARDS PS SIDE OF THE TRACKS. REFER TO CONCEPTUAL CROSS SECTIONS OF AWAY TRACTION POWER FACILITIES.
5. THE COMMUNICATION SITE SHALL HOUSE COMMUNICATION INTERFACE EQUIPMENT FOR SCADA SYSTEM AND OTHER WAYSIDE COMMUNICATION EQUIPMENT, AND SHALL REQUIRE 100' VERTICAL CLEARANCE.
6. THE GANTRIES SHALL BE 40 FEET HIGH (TYP).

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| DESIGNED BY M. PAZ |
| DRAWN BY V. LAVERDE |
| CHECKED BY V. SIBAL |
| IN CHARGE B. BANKS |
| DATE 8/29/2014 |

**PARSONS
BRINCKERHOFF**



CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT TRACTION POWER DIRECTIVE

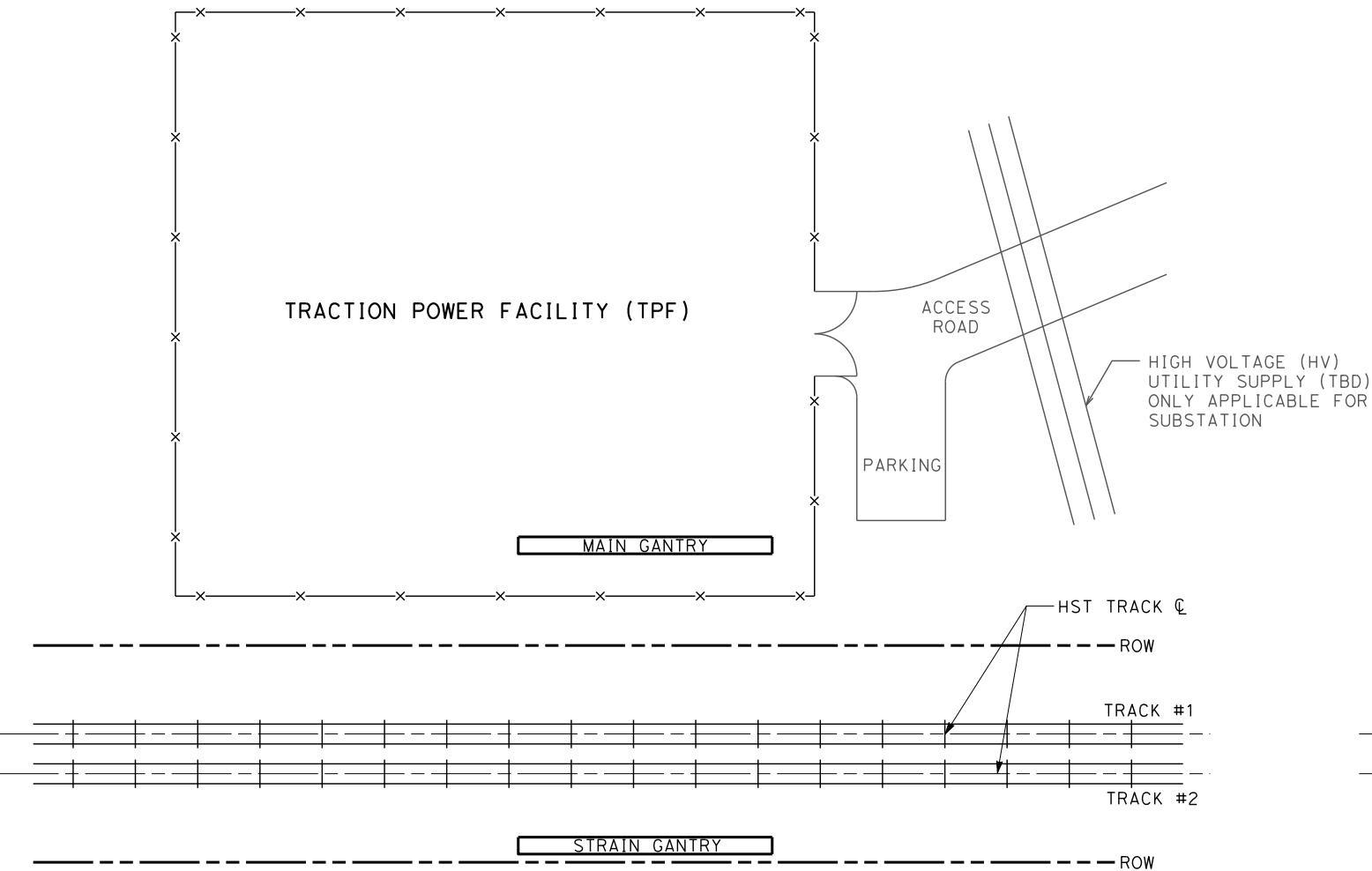
CONCEPTUAL LAYOUT
PARALLELING STATION

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| CONTRACT NO. |
| DRAWING NO. DD-TP-D301 |
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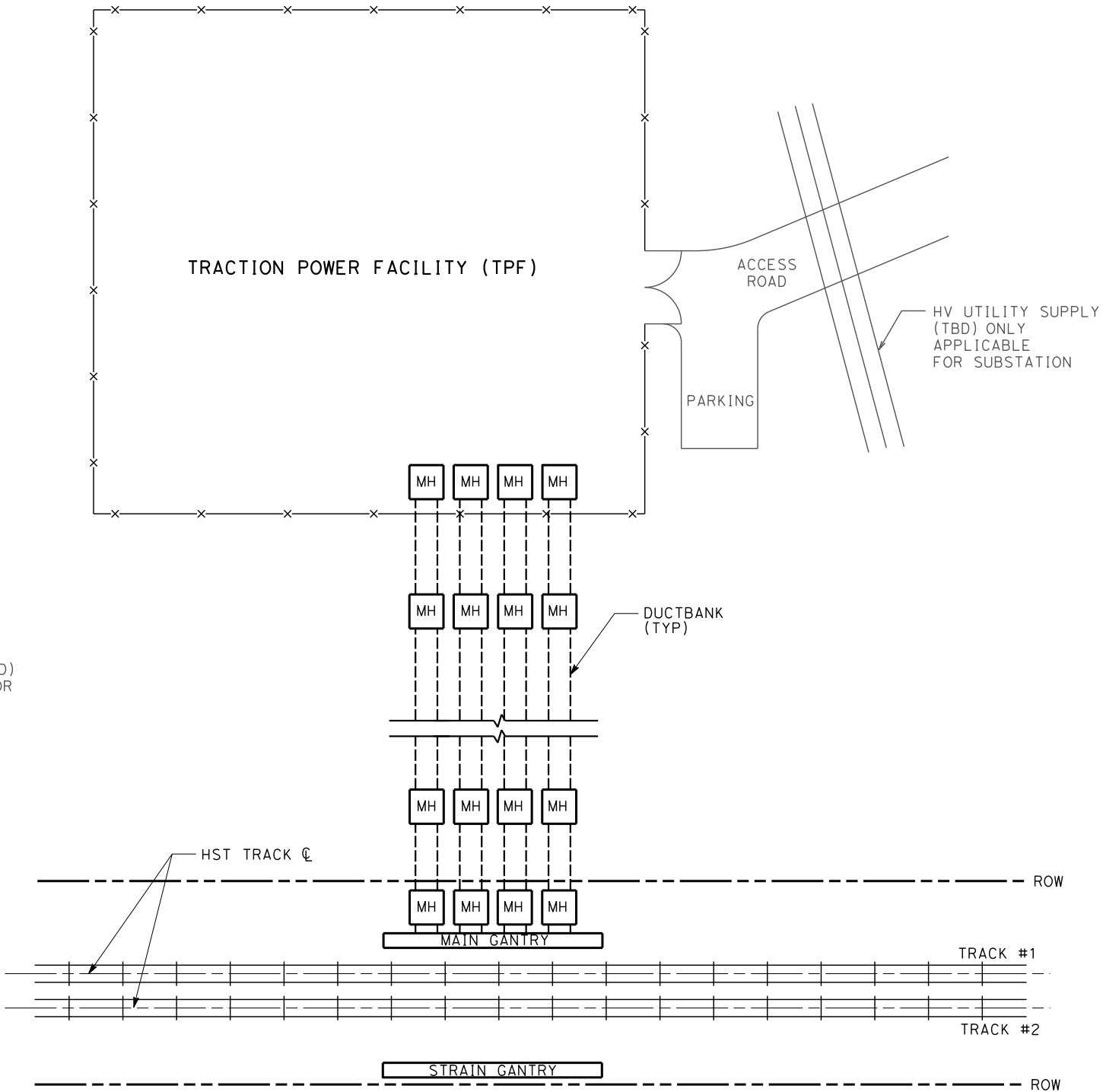
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NOTES:

1. THIS DRAWING SHOWS GANTRY ARRANGEMENT FOR AT-GRADE CONFIGURATION FOR TWO ALTERNATIVE OPTIONS:
- 1) TPF LOCATED ADJACENT TO TRACK ALIGNMENT;
2) TPF LOCATED AWAY FROM TRACK ALIGNMENT;
ALTERNATIVE 1 IS THE PREFERRED OPTION. ALTERNATIVE 2 MAY BE USED IF ADEQUATE LAND IS NOT AVAILABLE ADJACENT TO RAILROAD ROW.
2. ALTERNATIVE 2 SHALL BE USED FOR TRACK ALIGNMENT ON AERIAL STRUCTURES. SEE "TYPICAL DOUBLE CATENARY FEEDING GANTRY ARRANGEMENT ON AERIAL STRUCTURE" DRAWING.
3. THE SPACING AND NUMBER OF MANHOLES IS INDICATIVE ONLY. ACTUAL LAYOUT WILL DEPEND UPON THE SITE CONDITIONS.
4. THE MAIN GANTRY AND THE STRAIN GANTRY SHALL BE TYPICALLY 4' WIDE AND 40' HIGH.
5. SEE "TYPICAL SINGLE CATENARY FEEDING GANTRY ARRANGEMENT" AND "TYPICAL DOUBLE CATENARY FEEDING GANTRY ARRANGEMENT" DIRECTIVE DRAWINGS FOR GANTRY LOCATION DETAILS.
6. CONCEPTUAL DIMENSIONS FOR MAIN AND STRAIN GANTRY FOUNDATIONS ARE APPROXIMATELY 40' LONG AND 4' WIDE.



TPF LOCATED ADJACENT TO AT-GRADE HST TRACKWAY WITH EMBANKMENT HEIGHT (TOR-OG) ≤ 10 FEET



TPF LOCATED AWAY FROM AT-GRADE HST TRACKWAY OR EMBANKMENT HEIGHT (TOR-OG) > 10 FEET

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| DESIGNED BY M. PAZ |
| DRAWN BY V. HUANTE |
| CHECKED BY V. SIBAL |
| IN CHARGE B. BANKS |
| DATE 01/24/2014 |

PARSONS
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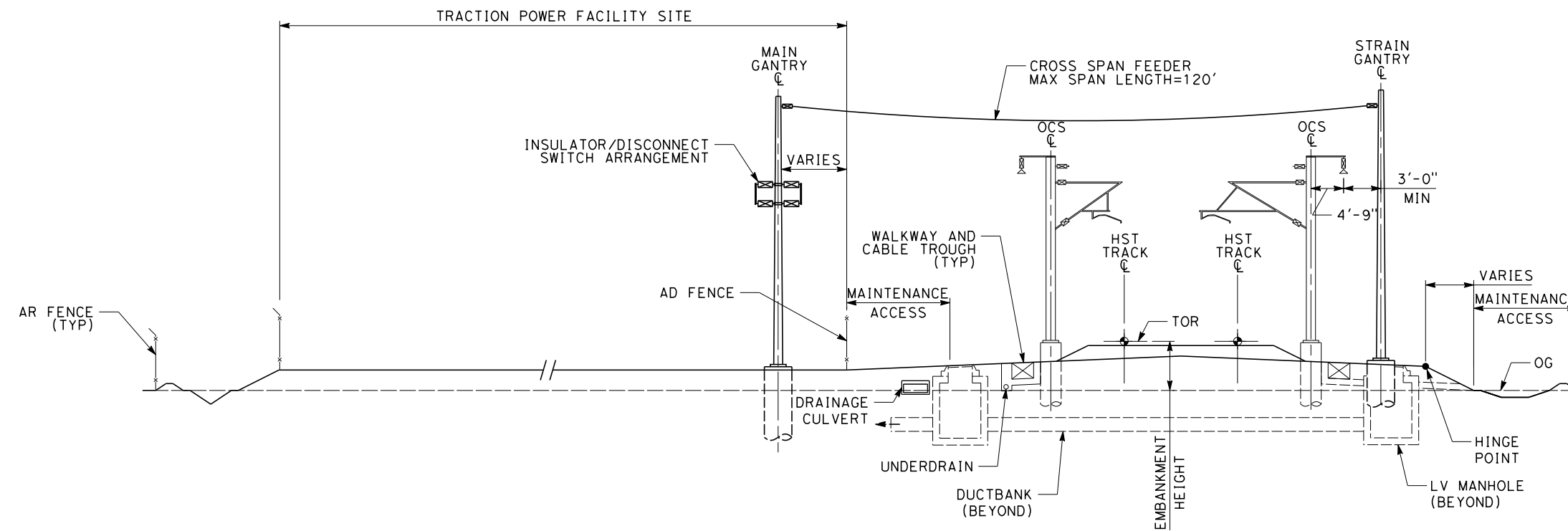
CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
TRACTION POWER DIRECTIVE

CONCEPTUAL LOCATIONS OF
TRACTION POWER FACILITIES

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| CONTRACT NO. 13341 |
| DRAWING NO. DD-TP-D401 |
| SCALE NO SCALE |
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NOTES:

1. TRACK AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. TYPICAL CROSS SECTIONAL WIDTH SHOWN SHALL BE PROVIDED FOR MINIMUM LENGTH EQUAL TO THE LONGITUDINAL WIDTH OF THE SYSTEMS SITE.
3. DRAWING SHOWS CROSS SECTION OF TYPICAL CATENARY FEEDING ARRANGEMENT WITH TRACTION POWER FACILITY AND TRACKWAY.
4. FOR TRACTION POWER SITE REQUIREMENTS SEE TRACTION POWER CONCEPTUAL SITE LAYOUT DIRECTIVE DRAWINGS.
5. A LOW VOLTAGE UNDERTRACK DUCTBANK TERMINATING AT LOW VOLTAGE MANHOLES SHALL BE PROVIDED AT EACH SYSTEMS SITE. SEE COMMUNICATIONS DESIGN CRITERIA MANUAL AND DIRECTIVE DRAWINGS FOR LOW VOLTAGE UNDERTRACK CONDUIT DUCTBANK AND MANHOLE REQUIREMENTS.
6. FOR ACCESS RESTRICTION FENCING AND BERM DETAILS, SEE CIVIL DIRECTIVE DRAWINGS.
7. FOR SITE DRAINAGE REQUIREMENTS, SEE DRAINAGE DIRECTIVE DRAWINGS.

TYPICAL SECTION
TRACTION POWER FACILITY SITE ADJACENT TO AT-GRADE HST TRACKWAY
WITH EMBANKMENT HEIGHT (TOR-OG) ≤ 10 FEET

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| DESIGNED BY M. PAZ |
| DRAWN BY V. LAVERDE |
| CHECKED BY V. SIBAL |
| IN CHARGE B. BANKS |
| DATE 8/29/2014 |

**PARSONS
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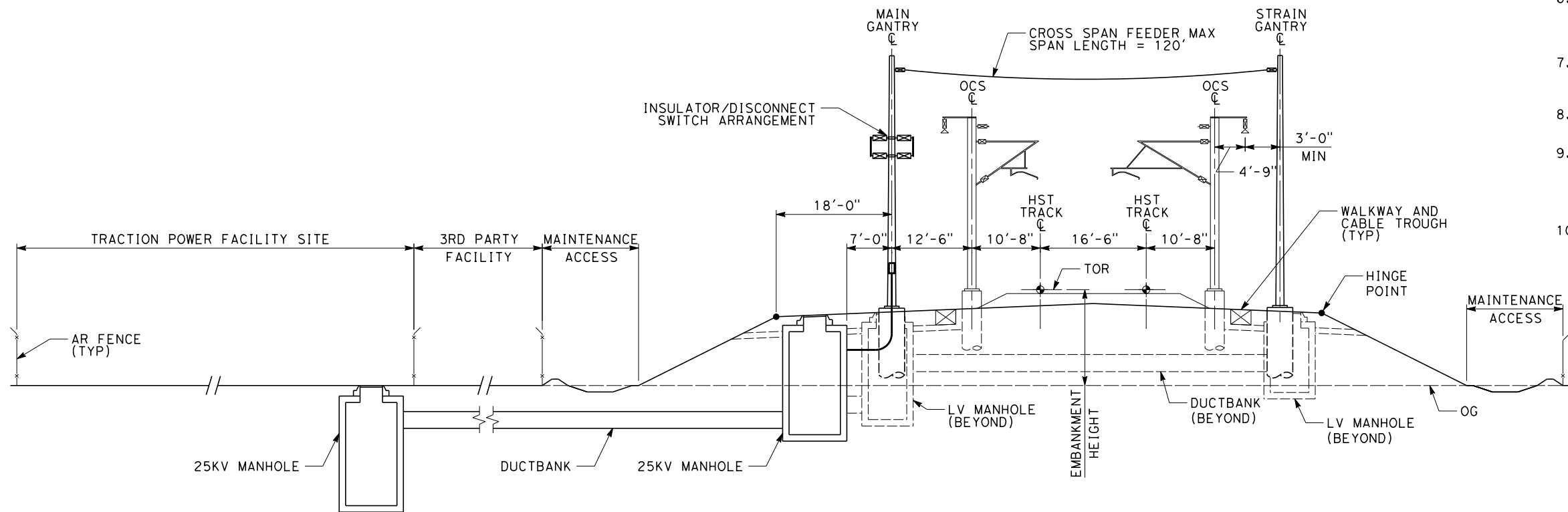
CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

**CALIFORNIA HIGH-SPEED TRAIN PROJECT
TRACTION POWER DIRECTIVE**

TYPICAL CATENARY FEEDING GANTRY ARRANGEMENT
TRACTION POWER FACILITY SITE
ADJACENT TO TRACKWAY

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| CONTRACT NO. |
| DRAWING NO. DD-TP-F101 |
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TYPICAL SECTION
TRACTION POWER FACILITY SITE AWAY FROM AT-GRADE HST TRACKWAY OR
EMBANKMENT HEIGHT (TOR-OG) >10 FEET

NOTES:

1. TYPICAL CROSS SECTIONAL WIDTH SHOWN SHALL BE PROVIDED FOR MINIMUM LENGTH EQUAL TO THE LONGITUDINAL WIDTH OF THE SYSTEMS SITE.
2. SYSTEM SITES AWAY FROM TRACKWAY, SEPARATED BY A THIRD-PARTY RIGHT-OF-WAY ARE UNDESIRABLE. AWAY CROSS-SECTION IS ONLY APPLICABLE IF ADJACENT SOLUTION IS DEMONSTRATED TO VIOLATE SITE SPACING REQUIREMENTS OR OTHER CRITICAL CRITERIA. FOR SITE REQUIREMENTS REFER TO TRACTION POWER SITE REQUIREMENTS.
3. A LOW VOLTAGE UNDERTRACK DUCTBANK WITH 2 LOW VOLTAGE MANHOLES PROVIDED AT SYSTEMS SITE. REFER TO COMMUNICATIONS DESIGN CRITERIA MANUAL AND DIRECTIVE DRAWINGS FOR LOW VOLTAGE UNDERTRACK CONDUIT DUCTBANK AND MANHOLE REQUIREMENTS.
4. LOW VOLTAGE UNDERGROUND DUCTBANK AND MANHOLE PROVIDED UNDERNEATH 3RD PARTY RIGHT-OF-WAY TO CONNECT TO LOW VOLTAGE UNDERTRACK MANHOLES AND DUCTBANK.
5. FOUR ASSEMBLIES, EACH CONSISTING OF A 25KV UNDERGROUND DUCTBANK WITH 2 25KV MANHOLES, PROVIDED AT EACH TRACTION POWER FACILITY SEPARATED FROM THE TRACKWAY BY THIRD PARTY RIGHT-OF-WAY.
6. FOR TRACTION POWER DUCT BANKS AND MANHOLE DETAILS, REFER TO "TYPICAL 25KV DUCT BANK DETAIL" AND "TYPICAL 25KV MANHOLE DETAIL" DIRECTIVE DRAWINGS.
7. FOR TRACTION POWER SITE REQUIREMENTS, REFER TO TRACTION POWER CONCEPTUAL SITE LAYOUT DIRECTIVE DRAWINGS.
8. FOR ACCESS RESTRICTION FENCING AND BERM DETAILS, REFER TO CIVIL DIRECTIVE DRAWINGS.
9. TRACK SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN. FOR SITE DRAINAGE REQUIREMENTS REFER TO DRAINAGE DIRECTIVE DRAWINGS.
10. FOR ACCESS ROADS, ACCESS GATE AND ACCESS TO TRACKWAY REQUIREMENTS REFER TO SAFETY AND SECURITY DESIGN REQUIREMENTS FOR INFRASTRUCTURE ELEMENTS AND CIVIL DESIGN CRITERIA.

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| DESIGNED BY M. PAZ |
| DRAWN BY V. HUANTE |
| CHECKED BY V. SIBAL |
| IN CHARGE B. BANKS |
| DATE 8/29/2014 |

**PARSONS
BRINCKERHOFF**



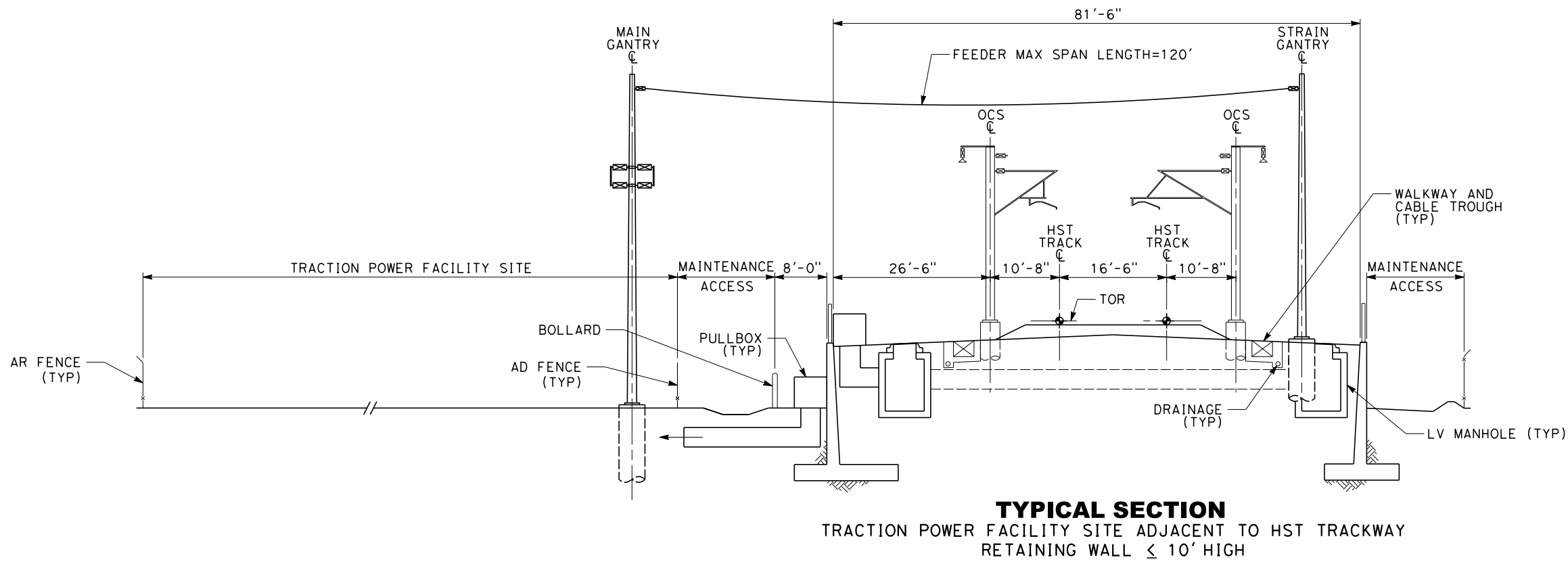
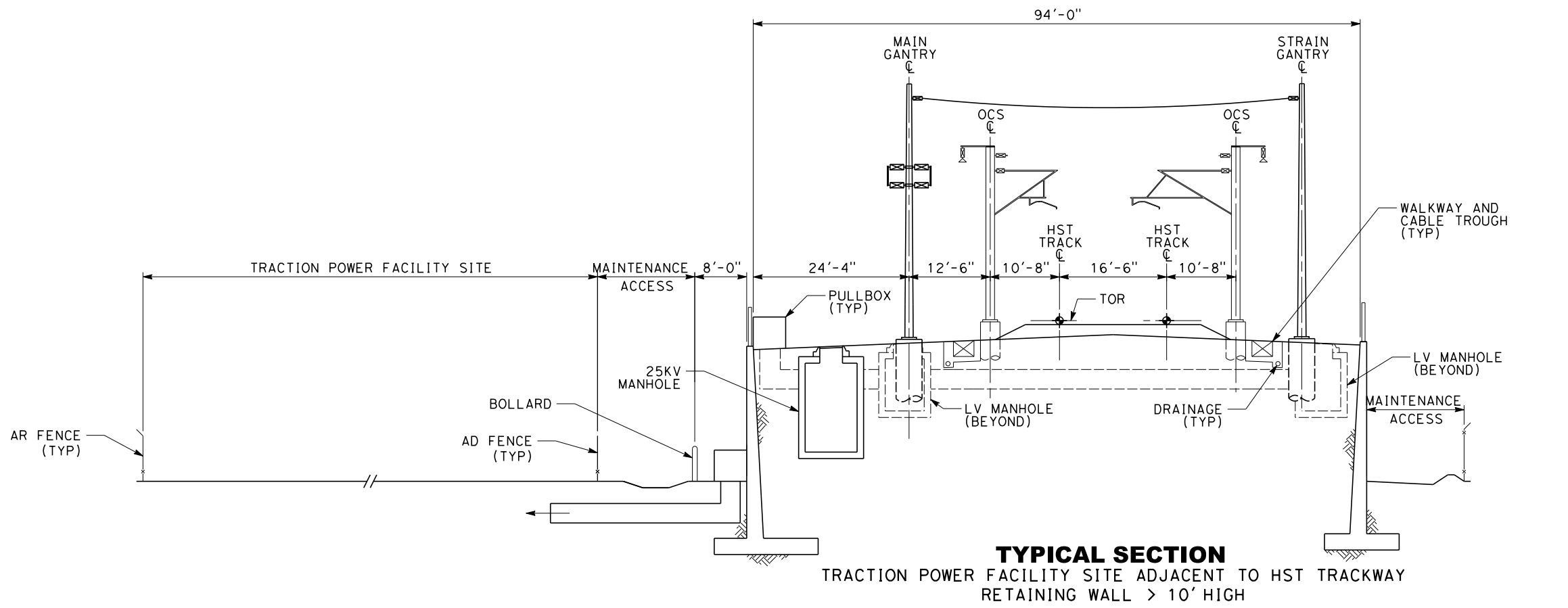
CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

**CALIFORNIA HIGH-SPEED TRAIN PROJECT
TRACTION POWER DIRECTIVE**

TYPICAL CATENARY FEEDING GANTRY ARRANGEMENT
TRACTION POWER FACILITY SITE
AWAY FROM TRACKWAY

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| CONTRACT NO. |
| DRAWING NO. DD-TP-F102 |
| SCALE NO SCALE |
| SHEET NO. |

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- NOTES:**
1. SYSTEM SITES AT RETAINED FILL TRACKWAY ARE UNDESIRABLE. THESE CROSS-SECTIONS ARE ONLY APPLICABLE IF AT-GRADE SOLUTION IS DEMONSTRATED TO VIOLATE SITE SPACING REQUIREMENTS OR OTHER CRITICAL CRITERIA.
 2. FOR RETAINED-FILLED TRACKWAYS, REINFORCED CONCRETE RETAINING WALLS SHALL BE USED AT SYSTEMS FACILITY SITES.
 3. TYPICAL CROSS SECTIONAL WIDTH SHOWN SHALL BE PROVIDED FOR MINIMUM LENGTH EQUAL TO THE LONGITUDINAL WIDTH OF THE SYSTEMS SITE.
 4. FOR ACCESS RESTRICTION FENCING AND BERM DETAILS, REFER TO CIVIL DIRECTIVE DRAWINGS.
 5. TRACK SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN. FOR SITE DRAINAGE REQUIREMENTS REFER TO DRAINAGE DIRECTIVE DRAWINGS.
 6. FOR ACCESS ROADS, ACCESS GATE AND ACCESS TO TRACKWAY REQUIREMENTS REFER TO SAFETY AND SECURITY DESIGN REQUIREMENTS FOR INFRASTRUCTURE ELEMENTS AND CIVIL DESIGN CRITERIA.
 7. A LOW VOLTAGE UNDERTRACK DUCTBANK WITH 2 LOW VOLTAGE MANHOLES SHALL BE PROVIDED AT SYSTEMS SITE. REFER TO COMMUNICATIONS DESIGN CRITERIA MANUAL AND DIRECTIVE DRAWINGS FOR LOW VOLTAGE UNDERTRACK CONDUIT DUCTBANK AND MANHOLE REQUIREMENTS.
 8. FOR TRACTION POWER SITE REQUIREMENTS, REFER TO TRACTION POWER CONCEPTUAL SITE LAYOUT DIRECTIVE DRAWINGS.

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| DESIGNED BY M. PAZ |
| DRAWN BY V. HUANTE |
| CHECKED BY V. SIBAL |
| IN CHARGE B. BANKS |
| DATE 8/29/2014 |

**PARSONS
BRINCKERHOFF**



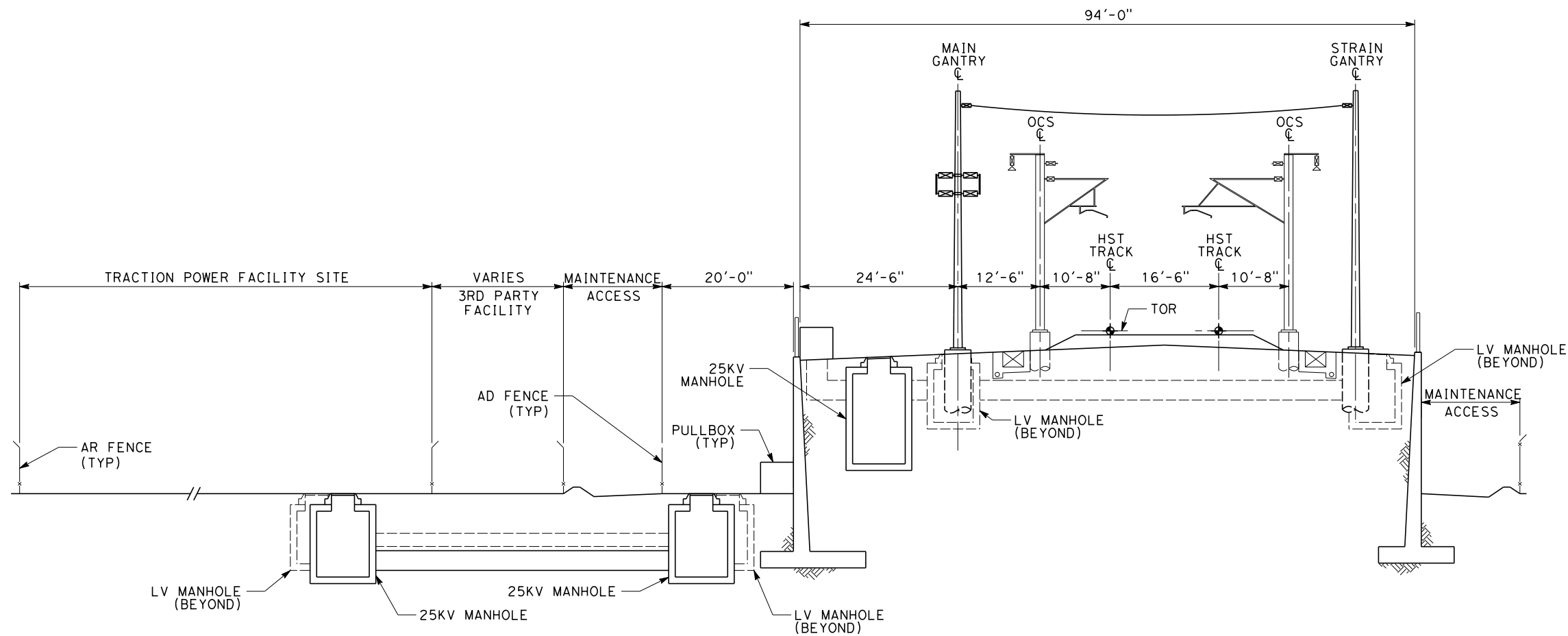
CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

**CALIFORNIA HIGH-SPEED TRAIN PROJECT
TRACTION POWER DIRECTIVE**

TYPICAL CATENARY FEEDING ARRANGEMENT
IN RETAINED-FILL FOR TRACTION POWER FACILITIES
ADJACENT TO TRACKWAY

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| DRAWING NO. DD-TP-F103 |
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TYPICAL SECTION
TRACTION POWER FACILITY SITE AWAY FROM RETAINED-FILL HST TRACKWAY

NOTES:

1. SYSTEM SITES AT RETAINED FILL TRACKWAY ARE UNDESIRABLE. THESE CROSS-SECTIONS ARE ONLY APPLICABLE IF AT-GRADE SOLUTION IS DEMONSTRATED TO VIOLATE SITE SPACING REQUIREMENTS OR OTHER CRITICAL CRITERIA.
2. FOR RETAINED-FILLED TRACKWAYS, REINFORCED CONCRETE RETAINING WALLS SHALL BE USED AT SYSTEMS FACILITY SITES.
3. SYSTEM SITES AWAY FROM TRACKWAY SEPARATED BY A THIRD-PARTY RIGHT-OF-WAY ARE UNDESIRABLE. AWAY CROSS-SECTION IS ONLY APPLICABLE IF ADJACENT SOLUTION IS DEMONSTRATED TO VIOLATE SITE SPACING REQUIREMENTS OR OTHER CRITICAL CRITERIA.
4. TYPICAL CROSS SECTIONAL WIDTH SHOWN SHALL BE PROVIDED FOR MINIMUM LENGTH EQUAL TO THE LONGITUDINAL WIDTH OF THE SYSTEMS SITE.
5. FOR TRACTION POWER DUCT BANKS AND MANHOLE DETAILS, REFER TO "TYPICAL 25KV DUCT BANK DETAIL AND TYPICAL 25KV MANHOLE DETAIL" DIRECTIVE DRAWINGS.
6. A LOW VOLTAGE UNDERTRACK DUCTBANK WITH 2 LOW VOLTAGE MANHOLES SHALL BE PROVIDED AT SYSTEMS SITE. REFER TO COMMUNICATIONS DESIGN CRITERIA MANUAL AND DIRECTIVE DRAWINGS FOR LOW VOLTAGE UNDERTRACK CONDUIT DUCTBANK AND MANHOLE REQUIREMENTS.
7. LOW VOLTAGE UNDERGROUND DUCTBANK AND MANHOLE TO BE PROVIDED UNDERNEATH 3RD PARTY RIGHT-OF-WAY.
8. FOUR ASSEMBLIES, EACH CONSISTING OF A 25KV UNDERGROUND DUCTBANKS WITH 2 25KV MANHOLES, PROVIDED AT EACH TRACTION POWER FACILITY SEPARATED FROM THE TRACKWAY BY THIRD PARTY RIGHT-OF-WAY.
9. FOR TRACTION POWER SITE REQUIREMENTS, REFER TO TRACTION POWER CONCEPTUAL SITE LAYOUT DIRECTIVE DRAWINGS.
10. FOR ACCESS RESTRICTION FENCING AND BERM DETAILS, REFER TO CIVIL DIRECTIVE DRAWINGS.
11. TRACK SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN. FOR SITE DRAINAGE REQUIREMENTS REFER TO DRAINAGE DIRECTIVE DRAWINGS.
12. FOR ACCESS ROADS, ACCESS GATE AND ACCESS TO TRACKWAY REQUIREMENTS REFER TO SAFETY AND SECURITY DESIGN REQUIREMENTS FOR INFRASTRUCTURE ELEMENTS AND CIVIL DESIGN CRITERIA.

RFP No.: 13-57 – Addendum No. 5 - 10/09/2014

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| DESIGNED BY M. PAZ |
| DRAWN BY V. HUANTE |
| CHECKED BY V. SIBAL |
| IN CHARGE B. BANKS |
| DATE 8/29/2014 |

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BRINCKERHOFF**



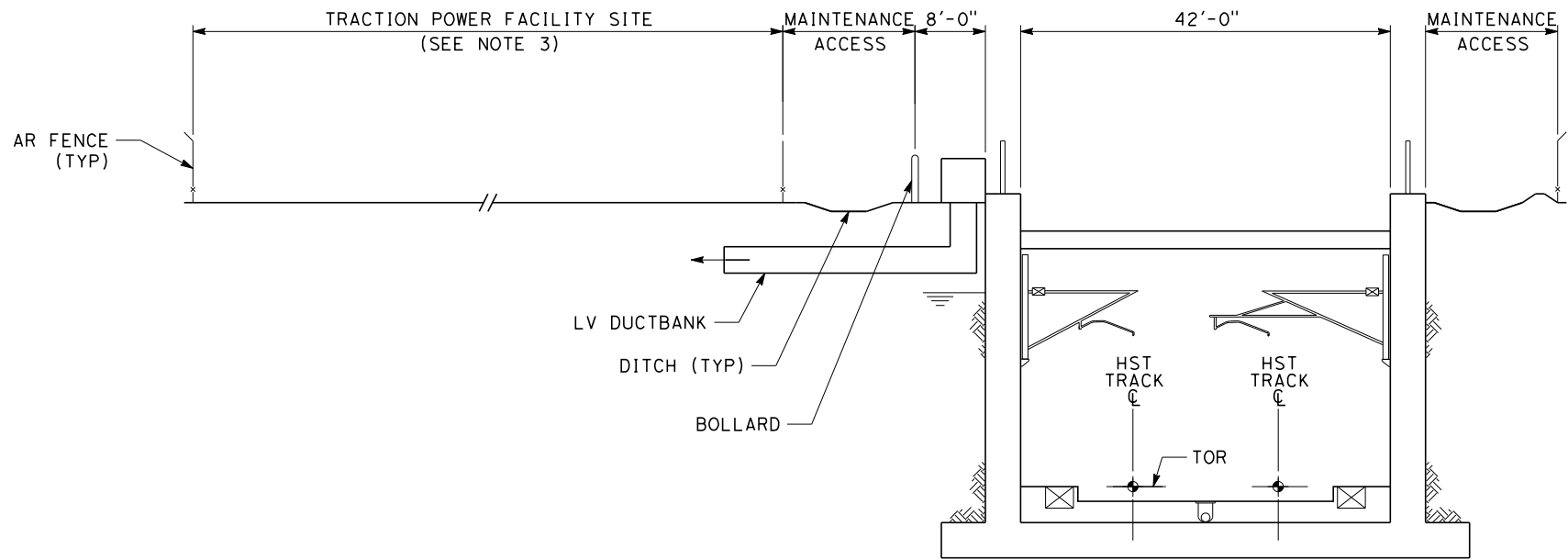
CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

**CALIFORNIA HIGH-SPEED TRAIN PROJECT
TRACTION POWER DIRECTIVE**

TYPICAL CATENARY FEEDING ARRANGEMENT
FOR TRACTION POWER FACILITIES
IN RETAINED-FILL AWAY FROM TRACKWAY

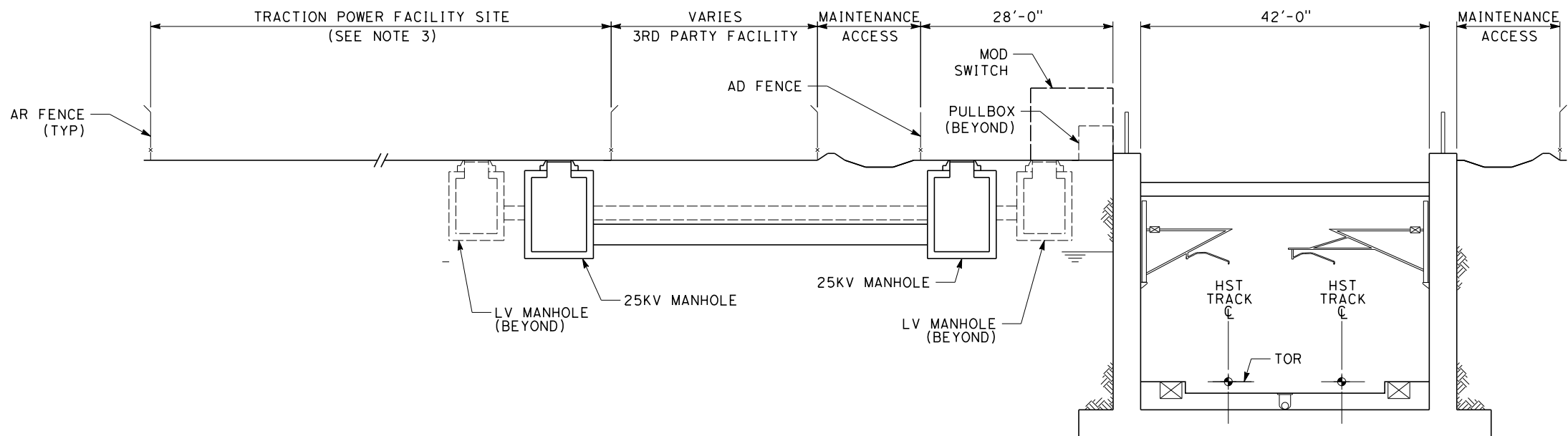
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TYPICAL SECTION

TRACTION POWER FACILITY SITE ADJACENT TO TRENCH HST TRACKWAY



TYPICAL SECTION

TRACTION POWER FACILITY SITE AWAY FROM TRENCH HST TRACKWAY

NOTES:

1. SYSTEM SITES AT TRENCH TRACKWAY ARE UNDESIRABLE. THESE CROSS-SECTIONS ARE ONLY APPLICABLE IF AT-GRADE SOLUTION IS DEMONSTRATED TO VIOLATE SITE SPACING REQUIREMENTS OR OTHER CRITICAL CRITERIA.
2. FOR RETAINED-FILLED TRACKWAYS, REINFORCED CONCRETE RETAINING WALLS SHALL BE USED AT SYSTEMS FACILITY SITES.
3. SYSTEM SITES AWAY FROM TRACKWAY SEPARATED BY A THIRD PARTY RIGHT-OF-WAY ARE UNDESIRABLE. AWAY CROSS-SECTION IS ONLY APPLICABLE IF ADJACENT SOLUTION IS DEMONSTRATED TO VIOLATE SITE SPACING REQUIREMENTS OR OTHER CRITICAL CRITERIA.
4. TYPICAL CROSS-SECTIONAL WIDTH SHOWN SHALL BE PROVIDED FOR MINIMUM LENGTH EQUAL TO THE LONGITUDINAL WIDTH OF THE SYSTEMS SITE.
5. FOR TRACTION POWER DUCT BANKS AND MANHOLE DETAILS, REFER TO "TYPICAL 25KV DUCT BANK DETAIL" AND "TYPICAL 25KV MANHOLE DETAIL" DIRECTIVE DRAWINGS.
6. LOW VOLTAGE UNDERGROUND DUCTBANK AND MANHOLE SHALL BE PROVIDED UNDERNEATH THIRD PARTY RIGHT-OF-WAY TO CONNECT TO LOW VOLTAGE UNDERTRACK MANHOLES AND DUCTBANK. REFER TO COMMUNICATIONS DESIGN CRITERIA MANUAL AND DIRECTIVE DRAWINGS FOR LOW VOLTAGE UNDERTRACK CONDUIT DUCTBANK AND MANHOLE REQUIREMENTS.
7. FOUR ASSEMBLIES EACH CONSISTING OF 25KV UNDERGROUND DUCTBANKS WITH 2 25KV MANHOLES PROVIDED AT EACH TRACTION POWER FACILITY SEPARATED FROM THE TRACKWAY BY THIRD PARTY RIGHT-OF-WAY.
8. FOR TRACTION POWER SITE REQUIREMENTS, REFER TO TRACTION POWER CONCEPTUAL SITE LAYOUT DIRECTIVE DRAWINGS.
9. FOR ACCESS RESTRICTION FENCING AND BERM DETAILS, REFER TO CIVIL DIRECTIVE DRAWINGS.
10. TRACK SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN. FOR SITE DRAINAGE REQUIREMENTS REFER TO DRAINAGE DIRECTIVE DRAWINGS.
11. FOR ACCESS ROADS, ACCESS GATE AND ACCESS TO TRACKWAY REQUIREMENTS REFER TO SAFETY AND SECURITY DESIGN REQUIREMENTS FOR INFRASTRUCTURE ELEMENTS AND CIVIL DESIGN CRITERIA.

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| IN CHARGE B. BANKS |
| DATE 8/29/2014 |

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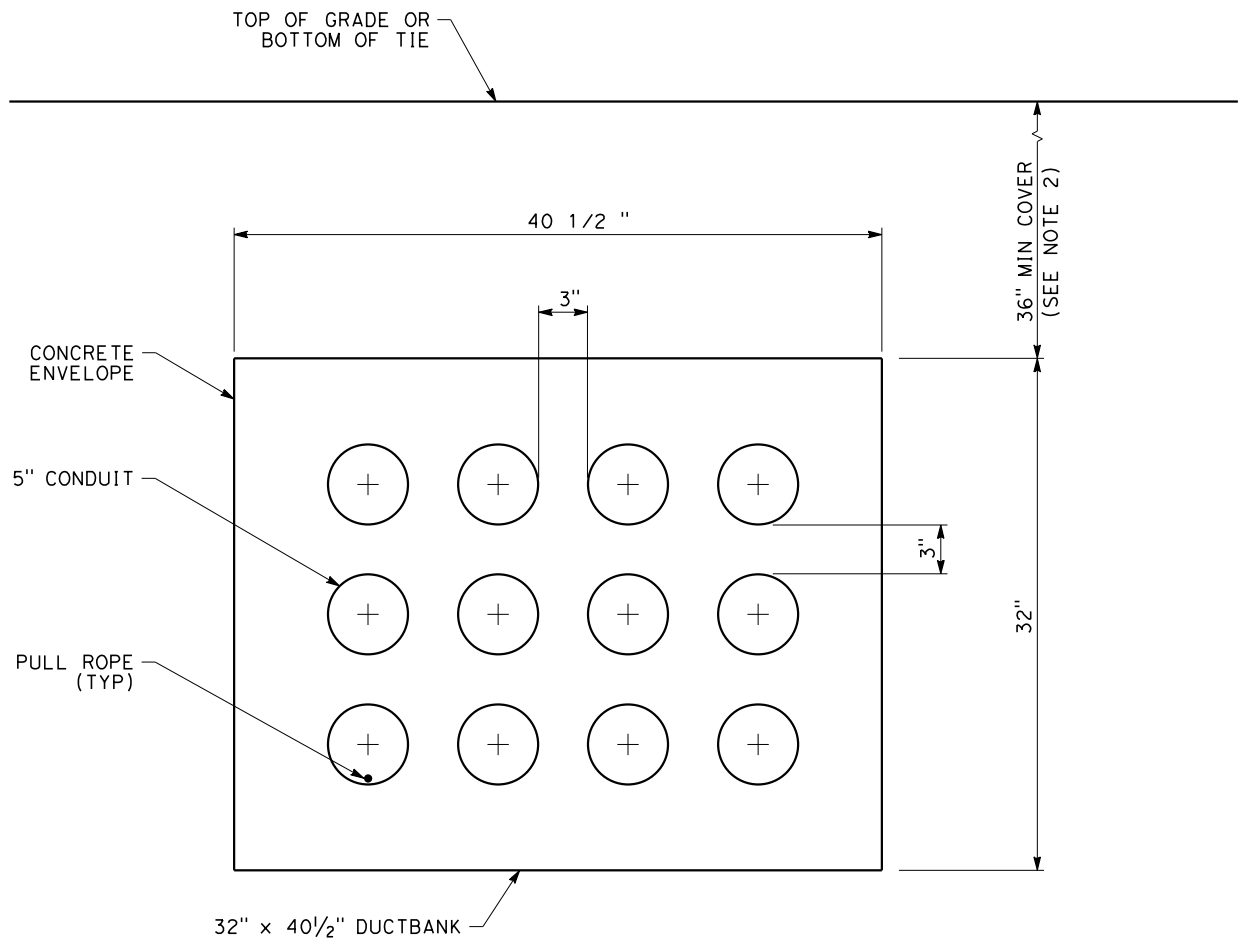
CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

**CALIFORNIA HIGH-SPEED TRAIN PROJECT
TRACTION POWER DIRECTIVE**

SYSTEMS SITE
TRACTION POWER FACILITY
TRENCH

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| CONTRACT NO. |
| DRAWING NO. DD-TP-F105 |
| SCALE NO SCALE |
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3x4-WAY DUCT BANK ①
NO SCALE

NOTES:

1. THIS DRAWING SHOWS TYPICAL DUCT BANK DETAILS FOR 5" CONDUIT FOR ILLUSTRATION PURPOSES ONLY. DESIGN THE DUCT BANK TO SITE AND EQUIPMENT SPECIFIC REQUIREMENTS CONFORMING TO RELEVANT CODES, SPECIFICATIONS AND DESIGN CRITERIA.
2. A 36" MINIMUM COVER SHALL BE MAINTAINED FROM TOP OF GRADE TO TOP OF DUCT BANK, WHEN NOT GOING UNDER RAILROAD TRACK, AND A MINIMUM 5'-6" UNDER RAILROAD TRACKS FROM THE BOTTOM OF TIE.
3. THE CONDUIT MATERIAL SHALL BE PVC OR FRE.
4. 25KV CATENARY FEEDER, 25KV NEGATIVE FEEDER, TRACTION RETURN CABLING, HV/MV CABLES FOR FACILITY/AUXILIARY POWER SUPPLY, AND LOW VOLTAGE CABLES (AUXILIARY POWER SUPPLY, COMMUNICATIONS, SIGNALING AND TRAIN CONTROL) MAY BE ROUTED IN THE SAME DUCTBANK BUT IN SEPARATE CONDUITS.

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| IN CHARGE B. BANKS |
| DATE 01/24/2014 |

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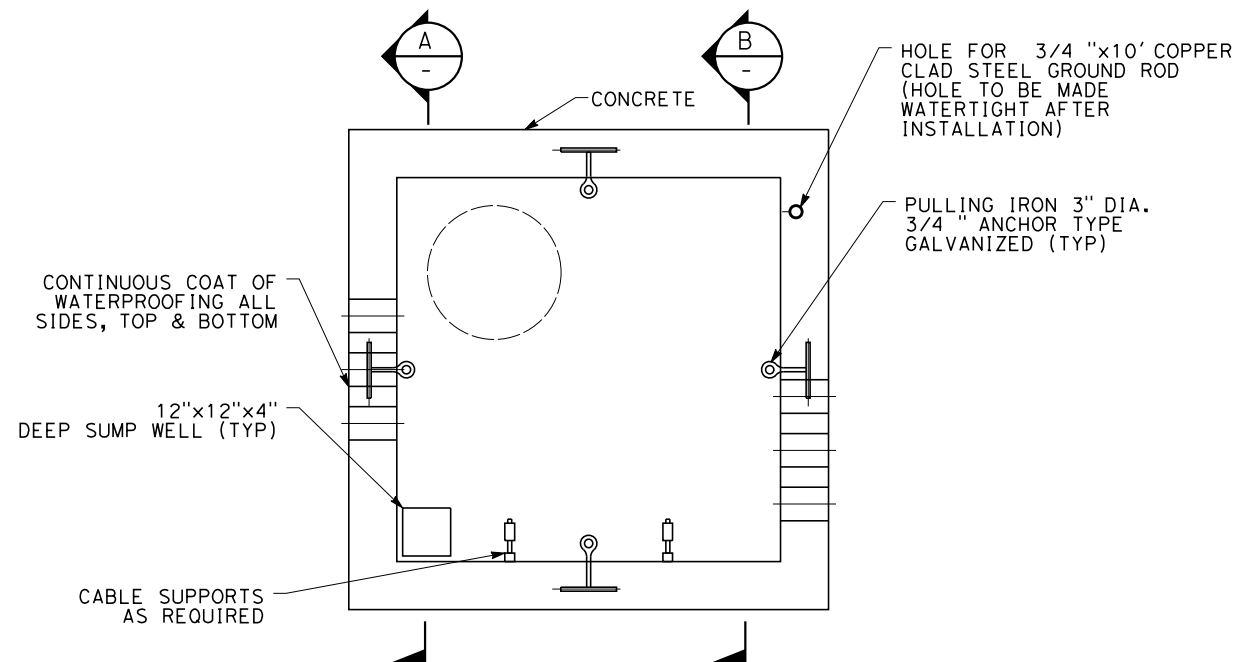
CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

**CALIFORNIA HIGH-SPEED TRAIN PROJECT
TRACTION POWER DIRECTIVE**

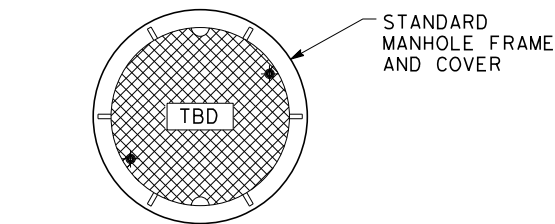
TYPICAL 25KV DUCT BANK DETAIL

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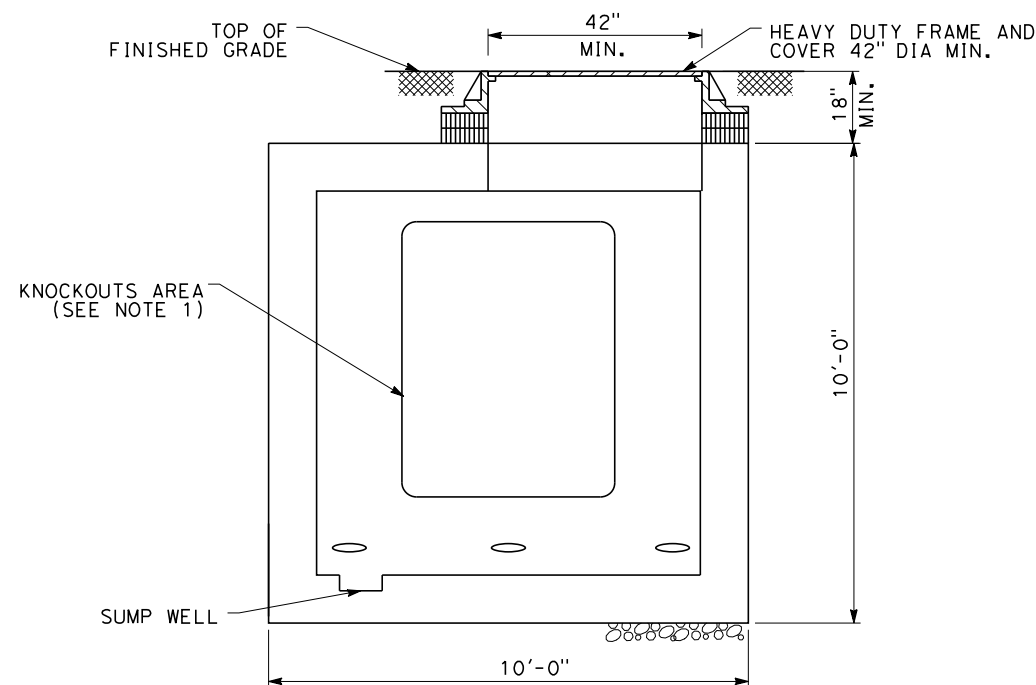
PLAN
TYPICAL PRECAST ELECTRIC MANHOLE



PLAN
ELECTRIC MANHOLE FRAME
AND COVER DETAIL

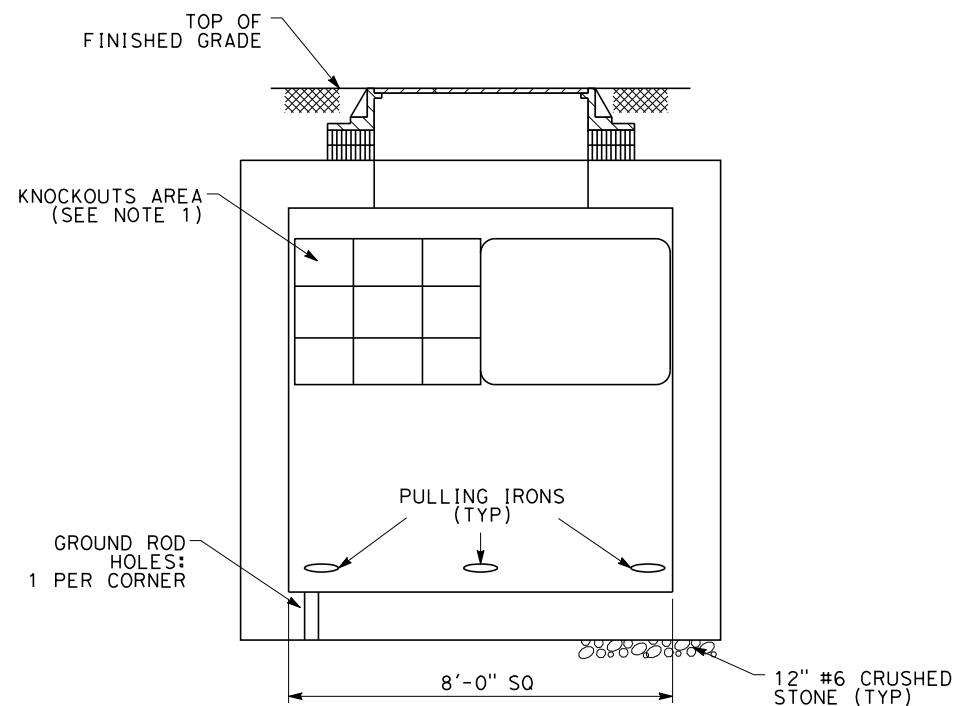
NOTES:

1. THIS DRAWING SHOWS TYPICAL DUCT BANK KNOCKOUTS IN A PRECAST MANHOLE. EXACT DETAILS TO BE WORKED OUT AT DETAILED DESIGN LEVEL.
2. ALL TRACTION POWER MANHOLES SHALL BE TYPICALLY 10'-0" L X 10'-0" W X 10'-0" DEEP AND BE WATERTIGHT WITH SILICON SEALING COMPOUND, OR APPROVED EQUAL.
3. THE MANHOLE FRAME SHALL BE GROUTED TO THE ROOF SLAB.
4. THICKNESS OF MANHOLE WALL SHALL BE 8" MINIMUM.
5. APPROVED CABLE RACK ARMS TO BE INSTALLED TO ACCOMMODATE CABLE, MINIMUM 2 RACKS PER WALL (TYP).
6. PULLING HOOKS SHALL BE GALVANIZED STEEL, SUPPLIED AND CAST INTO WALLS BY PRECASTER, AND ANCHORED BEHIND REINFORCEMENT. QUANTITY AND LOCATION TO SUIT.
7. CONNECT ALL METALLIC PARTS, FRAME, PULLING HOOKS, ETC., TO THE TRACTION POWER FACILITY GROUND GRID OR GROUND ROD.
8. PROVIDE FOR CONNECTION TO A PORTABLE PUMP TO REMOVE ACCUMULATED WATER FROM THE MANHOLE OR OTHER SITE SPECIFIC DRAINAGE SYSTEM.
9. 25KV CATENARY FEEDER, 25KV NEGATIVE FEEDER, TRACTION RETURN CABLING, HV/MV CABLES FOR FACILITY/AUXILIARY POWER SUPPLY, AND LOW VOLTAGE CABLES (AUXILIARY POWER SUPPLY, COMMUNICATIONS, SIGNALING AND TRAIN CONTROL) SHALL BE ROUTED IN SEPARATE MANHOLES.



TYPICAL PRECAST ELECTRIC MANHOLE

SECTION A
NO SCALE



TYPICAL PRECAST ELECTRIC MANHOLE

SECTION B
NO SCALE

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| CHECKED BY V. SIBAL |
| IN CHARGE B. BANKS |
| DATE 8/29/2014 |

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CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

**CALIFORNIA HIGH-SPEED TRAIN PROJECT
TRACTION POWER DIRECTIVE**

TYPICAL 25KV MANHOLE DETAILS

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| DRAWING NO. DD-TP-N111 |
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| SHEET NO. |

California High-Speed Rail Authority



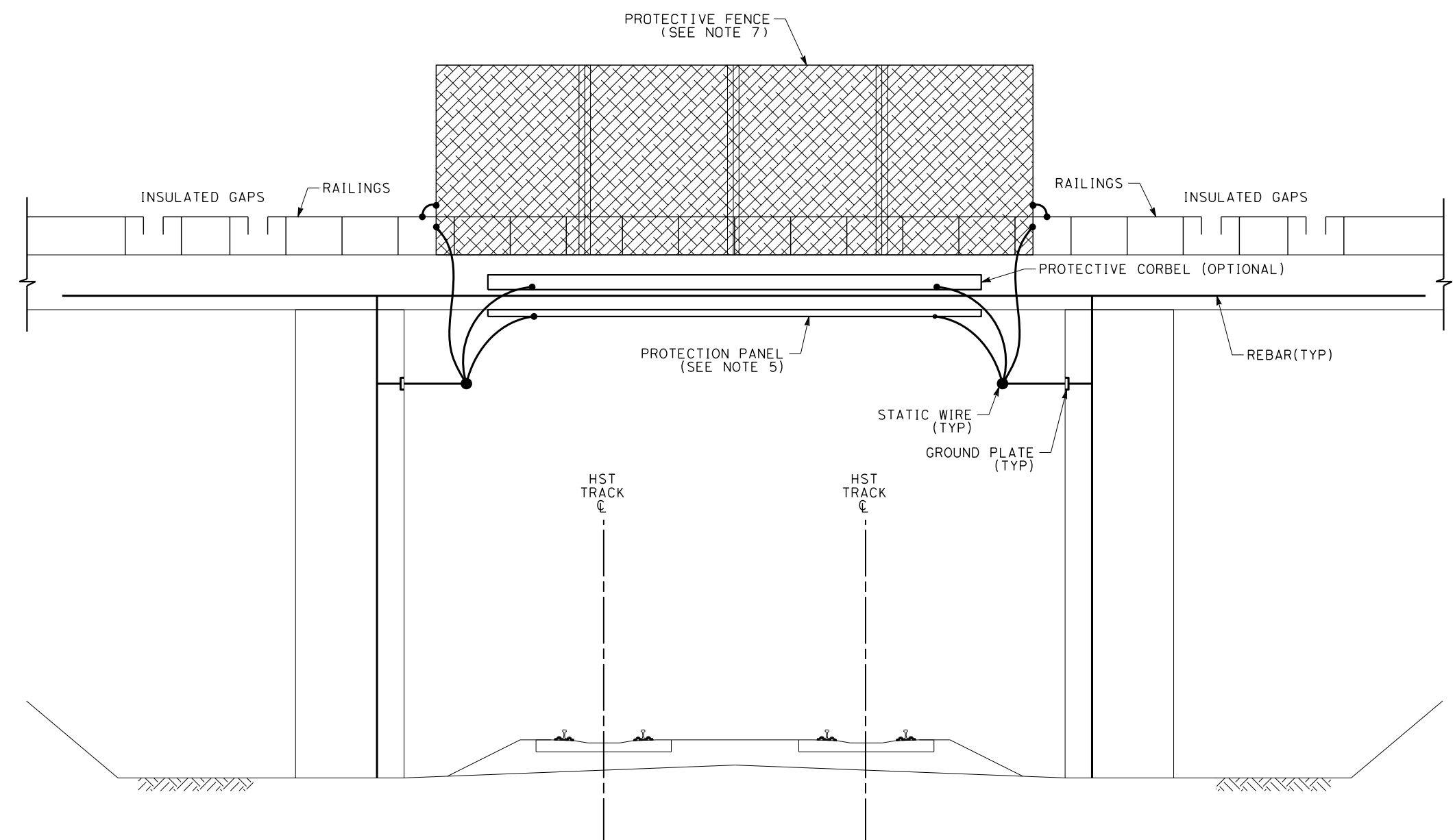
RFP No.: HSR 13-57

**Request for Proposals for Design-Build
Services for Construction Package 2-3**

**Book III, Part B.1
Directive Drawings**

Overhead Contact System

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TYPICAL OVERHEAD STRUCTURE GROUNDING AND BONDING

NOTES:

1. TRACK, STRUCTURES, AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. SMALL METALLIC ITEMS, SUCH AS RAILING, FENCE ETC, BEYOND THE STEP AND TOUCH POTENTIAL LIMIT NEED NOT BE GROUNDED. THE STEP AND TOUCH POTENTIAL EXISTS WITHIN 8' OF A STANDING TRAIN, 8' FROM ANY ELECTRICALLY CONTINUOUS BONDED FENCE, AND 8' FROM ANY METALLIC ITEM BONDED TO STATIC WIRE.
3. GROUNDING AND BONDING DETAILS DESIGN SHALL BE COORDINATED WITH OVERPASS STRUCTURE DESIGNER.
4. OVERHEAD BRIDGE GROUNDING AND BONDING DETAILS SHOWN IN DRAWING ARE GENERIC IN NATURE. THE OCS DESIGNER SHALL PROVIDE DETAILED ASSEMBLIES AND COMPONENTS THAT MEET THE REQUIREMENT.
5. GALVANIZED STEEL STRIP OR ANGLE SECTION SHALL BE INSTALLED ABOVE THE OVERHEAD LINE AT EACH BRIDGE FACE, IF THE BRIDGE SOFFIT IS WITHIN THE PANTOGRAPH ZONE. WHEN THE VERTICAL CLEARANCE BETWEEN OCS CONDUCTORS AND CONCRETE OVERPASSES IS LESS THAN 3 FEET, PROTECTION PANELS (FLASH PLATES) SHALL BE INSTALLED ABOVE THE OCS, ATTACHED TO THE UNDERSIDE OF THE STRUCTURE, AND INTERCONNECTED TO THE STATIC WIRE AT NOT LESS THAN TWO LOCATIONS.
6. THE GROUND PLATE SHALL BE NO LESS THAN 6" X 6" IN DIMENSION.
7. SEE OVERHEAD CONTACT SYSTEM AND TRACTION POWER RETURN SYSTEM AND CIVIL DESIGN CRITERIA CHAPTERS FOR PROTECTIVE FENCE CRITERIA.

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| DESIGNED BY J. LAU |
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| CHECKED BY M. HSIAO |
| IN CHARGE B. BANKS |
| DATE 01/24/2014 |

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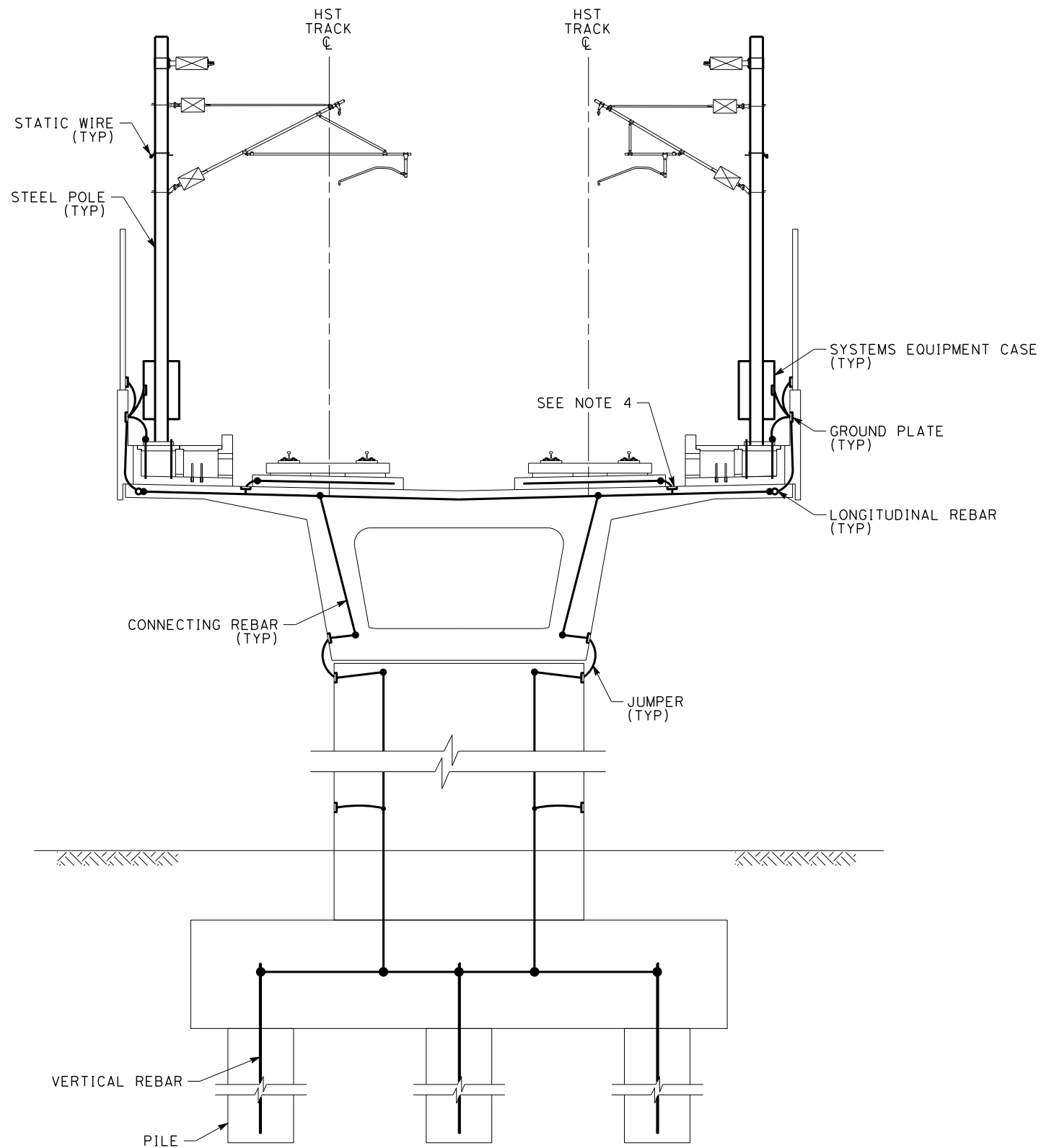
CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
OVERHEAD CONTACT SYSTEM DIRECTIVE

TYPICAL GROUNDING AND BONDING ARRANGEMENT
OVERHEAD BRIDGE STRUCTURE

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TYPICAL OCS GROUNDING AND BONDING
AT AERIAL STRUCTURE

NOTES:

1. TRACK, STRUCTURES, AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. GROUNDING AND BONDING DETAIL DESIGN SHALL BE COORDINATED WITH AERIAL STRUCTURE DESIGNER.
3. THE GROUNDING AND BONDING FOR THE EMERGENCY WALKWAY AREA AND OTHER PUBLICLY ACCESSIBLE AREAS SHALL BE DESIGNED TO AVOID INADMISSIBLE TOUCH AND STEP VOLTAGES AND ALSO MEET SIGNALING OPERATION REQUIREMENTS.
4. FOR LOCATIONS OF THE GROUND PLATES, SEE GROUNDING AND BONDING DESIGN CRITERIA FOR DETAIL.
5. THE GROUND PLATES ON THE AERIAL STRUCTURE SLAB SHALL BE PLACED BETWEEN THE EDGE OF THE TRACK SLAB AND DERAILMENT WALL.
6. THE GROUND PLATE SHALL BE NO LESS THAN 6"X6" IN DIMENSION.
7. INDIVIDUAL CONCRETE TIES DO NOT NEED TO BE BONDED TO THE TRACTION POWER RETURN SYSTEM. STEEL REINFORCEMENT IN PRECAST CONCRETE PANELS FOR DIRECT FIXATION TRACK SHALL BE BONDED AND CONNECTED TO THE TRACTION POWER RETURN SYSTEM.
8. STEEL REINFORCED CONCRETE PARAPETS AND CONDUCTIVE SCREEN, NOISE, WIND OR SAFETY BARRIERS OR RAILINGS SHALL BE BONDED TO THE TRACTION POWER RETURN SYSTEM.

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| IN CHARGE B. BANKS |
| DATE 01/24/2014 |

**PARSONS
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CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

**CALIFORNIA HIGH-SPEED TRAIN PROJECT
OVERHEAD CONTACT SYSTEM DIRECTIVE**

TYPICAL GROUNDING AND BONDING ARRANGEMENT
AERIAL STRUCTURE

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California High-Speed Rail Authority



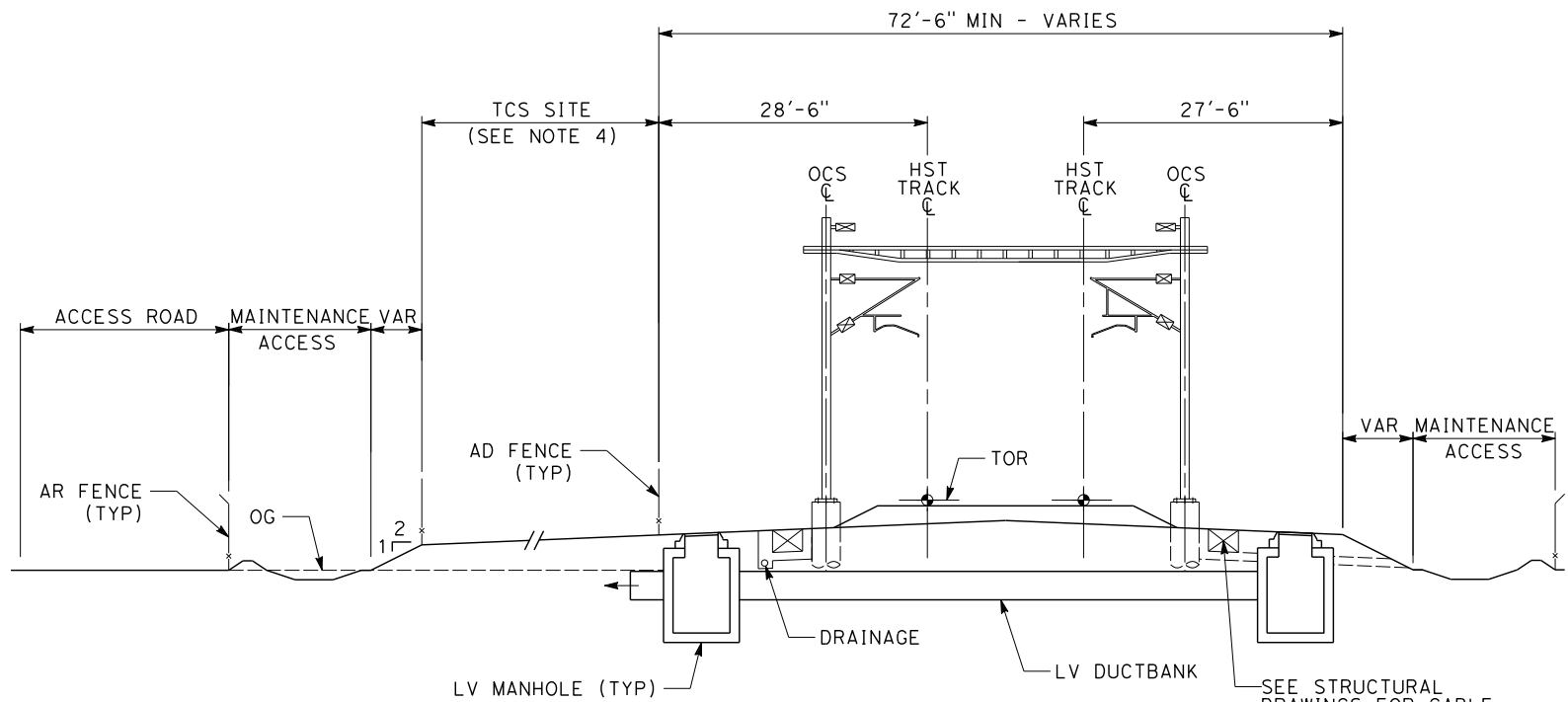
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**Request for Proposals for Design-Build
Services for Construction Package 2-3**

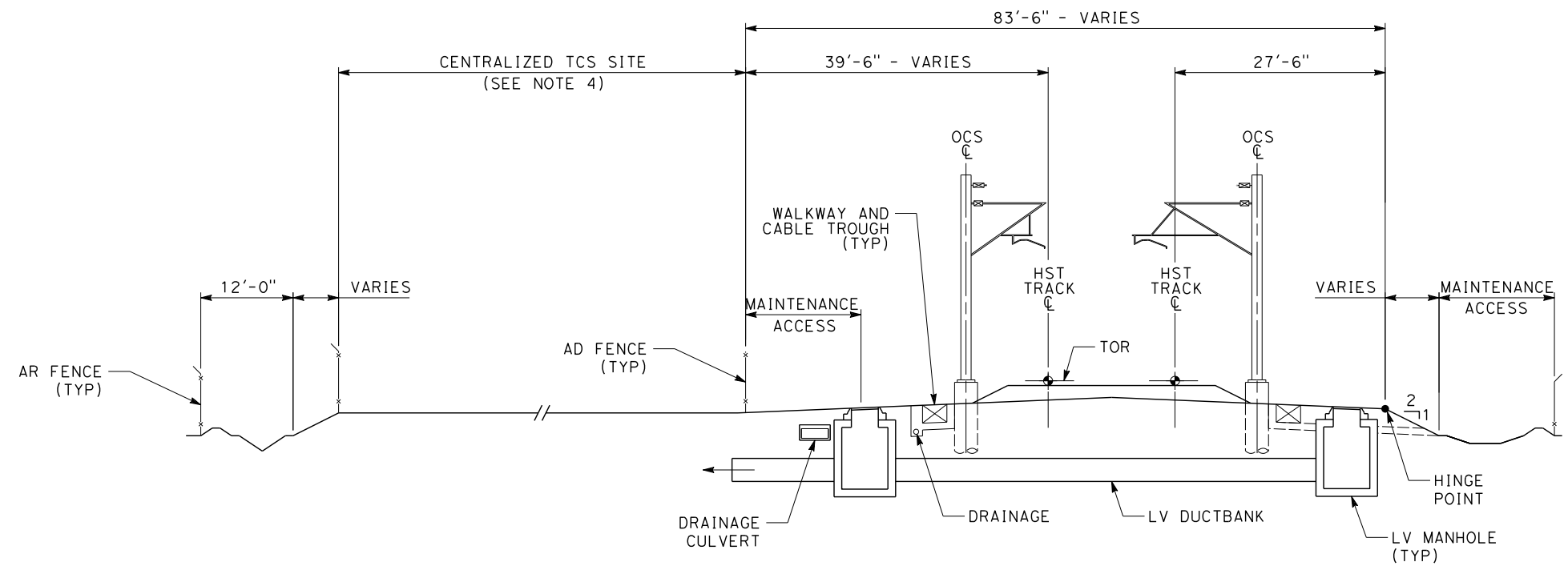
**Book II, Part B.1
Directive Drawings**

Automatic Train Control

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TYPICAL SECTION
TCS SITE ADJACENT TO AT-GRADE HST TRACKWAY



TYPICAL SECTION
CENTRALIZED TCS SITE ADJACENT TO AT-GRADE HST TRACKWAY

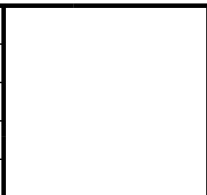
NOTES:

1. TYPICAL CROSS SECTIONAL WIDTH SHOWN SHALL BE PROVIDED FOR MINIMUM LENGTH EQUAL TO THE LONGITUDINAL WIDTH OF THE CENTRALIZED TRAIN CONTROL SITE OR FOR THE LONGITUDINAL DISTANCE BETWEEN FURTHEST TRAIN CONTROL SITES AT AN INTERLOCKING.
2. FOR TRAIN CONTROL SITE REQUIREMENTS REFER TO TYPICAL TRAIN CONTROL SITES LAYOUT DIRECTIVE DRAWINGS.
3. A LOW VOLTAGE UNDERTRACK DUCTBANK WITH 2 LOW VOLTAGE MANHOLES PROVIDED AT EACH SYSTEMS SITE. REFER TO COMMUNICATIONS DESIGN CRITERIA MANUAL AND DIRECTIVE DRAWINGS FOR LOW VOLTAGE UNDERTRACK CONDUIT DUCTBANK AND MANHOLE REQUIREMENTS.
4. FOR ACCESS RESTRICTION FENCING AND BERM DETAILS, REFER TO CIVIL DIRECTIVE DRAWINGS.
5. TRACK SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN. FOR SITE DRAINAGE REQUIREMENTS REFER TO DRAINAGE DIRECTIVE DRAWINGS.
6. FOR ACCESS ROADS, ACCESS GATE AND ACCESS TO TRACKWAY REQUIREMENTS REFER TO SAFETY AND SECURITY DESIGN REQUIREMENTS FOR INFRASTRUCTURE ELEMENTS AND CIVIL DESIGN CRITERIA.

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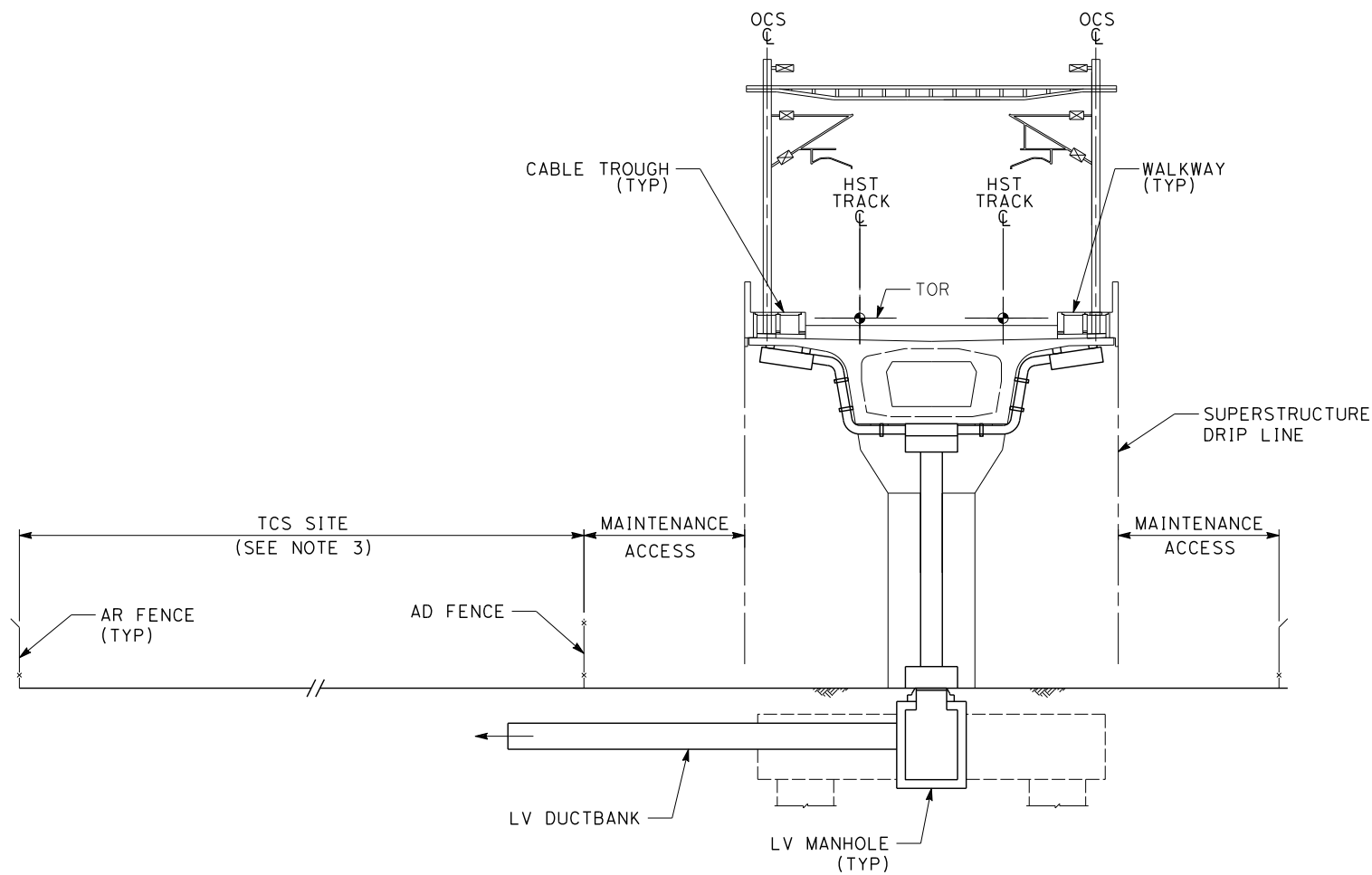
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| IN CHARGE B. BANKS |
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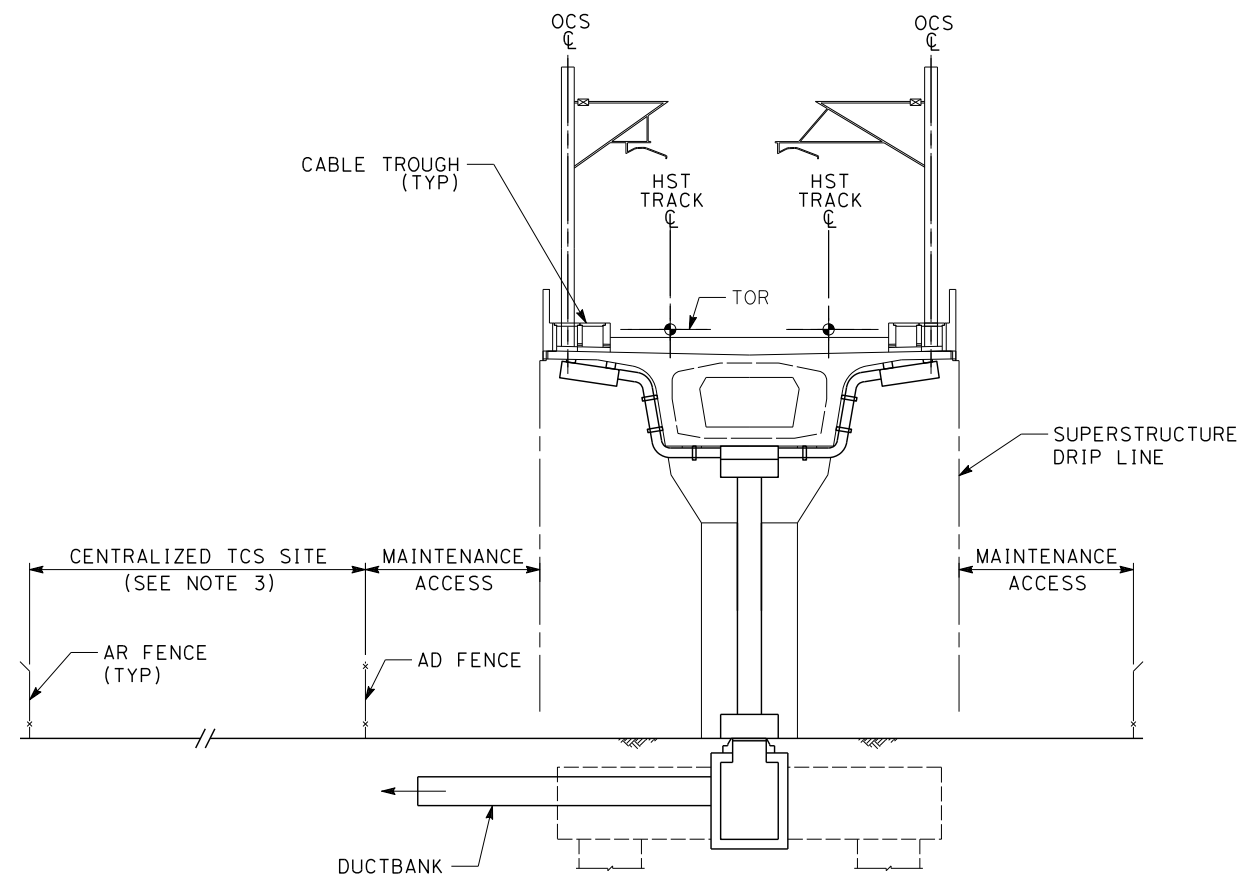
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TYPICAL SECTION
TCS SITE AT AERIAL TRACKWAY



TYPICAL SECTION
CENTRALIZED TCS SITE AT AERIAL TRACKWAY

NOTES:

1. SYSTEM SITES AT AERIAL TRACKWAY ARE UNDESIRABLE. THESE CROSS-SECTIONS ARE ONLY APPLICABLE IF AT-GRADE SOLUTION IS DEMONSTRATED TO VIOLATE SITE SPACING REQUIREMENTS OR OTHER CRITICAL CRITERIA.
2. FOR ACCESS RESTRICTION FENCING AND BERM DETAILS, REFER TO CIVIL DIRECTIVE DRAWINGS.
3. TRACK SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN. FOR SITE DRAINAGE REQUIREMENTS REFER TO DRAINAGE DIRECTIVE DRAWINGS.
4. FOR ACCESS ROADS, ACCESS GATE AND ACCESS TO TRACKWAY REQUIREMENTS REFER TO SAFETY AND SECURITY DESIGN REQUIREMENTS FOR INFRASTRUCTURE ELEMENTS AND CIVIL DESIGN CRITERIA.
5. TYPICAL CROSS SECTIONAL WIDTH SHOWN SHALL BE PROVIDED FOR MINIMUM LENGTH EQUAL TO THE LONGITUDINAL WIDTH OF THE CENTRALIZED TRAIN CONTROL SITE OR FOR THE LONGITUDINAL DISTANCE BETWEEN FURTHEST TRAIN CONTROL SITES AT AN INTERLOCKING.
6. FOR TRAIN CONTROL SITE REQUIREMENTS REFER TO TYPICAL TRAIN CONTROL SITES LAYOUT DIRECTIVE DRAWINGS.

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| DATE 8/29/2014 |

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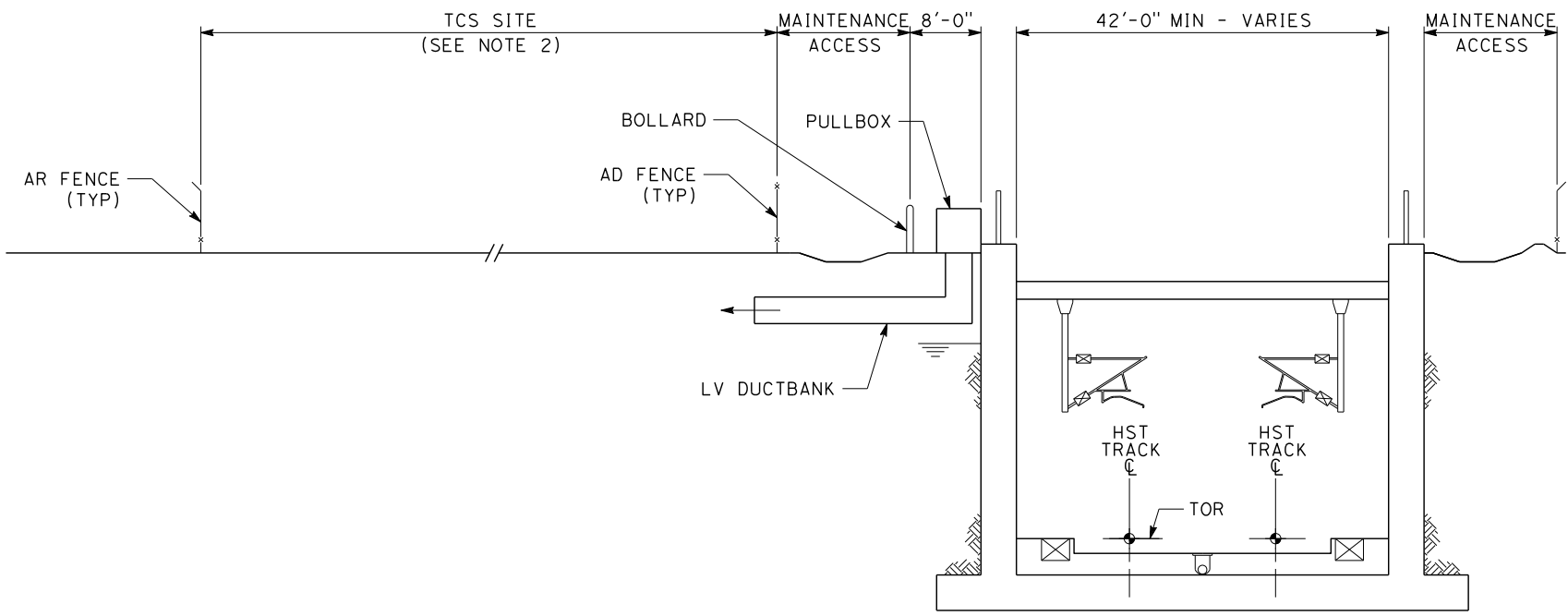
CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

**CALIFORNIA HIGH-SPEED TRAIN PROJECT
TRAIN CONTROL DIRECTIVE**

SYSTEMS SITE
TCS
AERIAL

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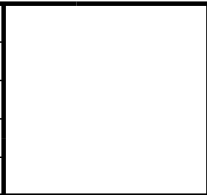


TYPICAL SECTION
TCS SITE ADJACENT TO HST TRACKWAY
TRENCH

- NOTES:**
- 1. TYPICAL CROSS SECTIONAL WIDTH SHOWN SHALL BE PROVIDED FOR MINIMUM LENGTH EQUAL TO THE LONGITUDINAL WIDTH OF THE TRAIN CONTROL SITE D OR FOR THE LONGITUDINAL DISTANCE BETWEEN FURTHEST TRAIN CONTROL SITES AT AN INTERLOCKING.
 - 2. FOR TRAIN CONTROL SITE REQUIREMENTS REFER TO TYPICAL TRAIN CONTROL SITES LAYOUT DIRECTIVE DRAWINGS.

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| DESIGNED BY I. MUFTIC |
| DRAWN BY V. HUANTE |
| CHECKED BY B. MCNALLY |
| IN CHARGE B. BANKS |
| DATE 8/29/2014 |

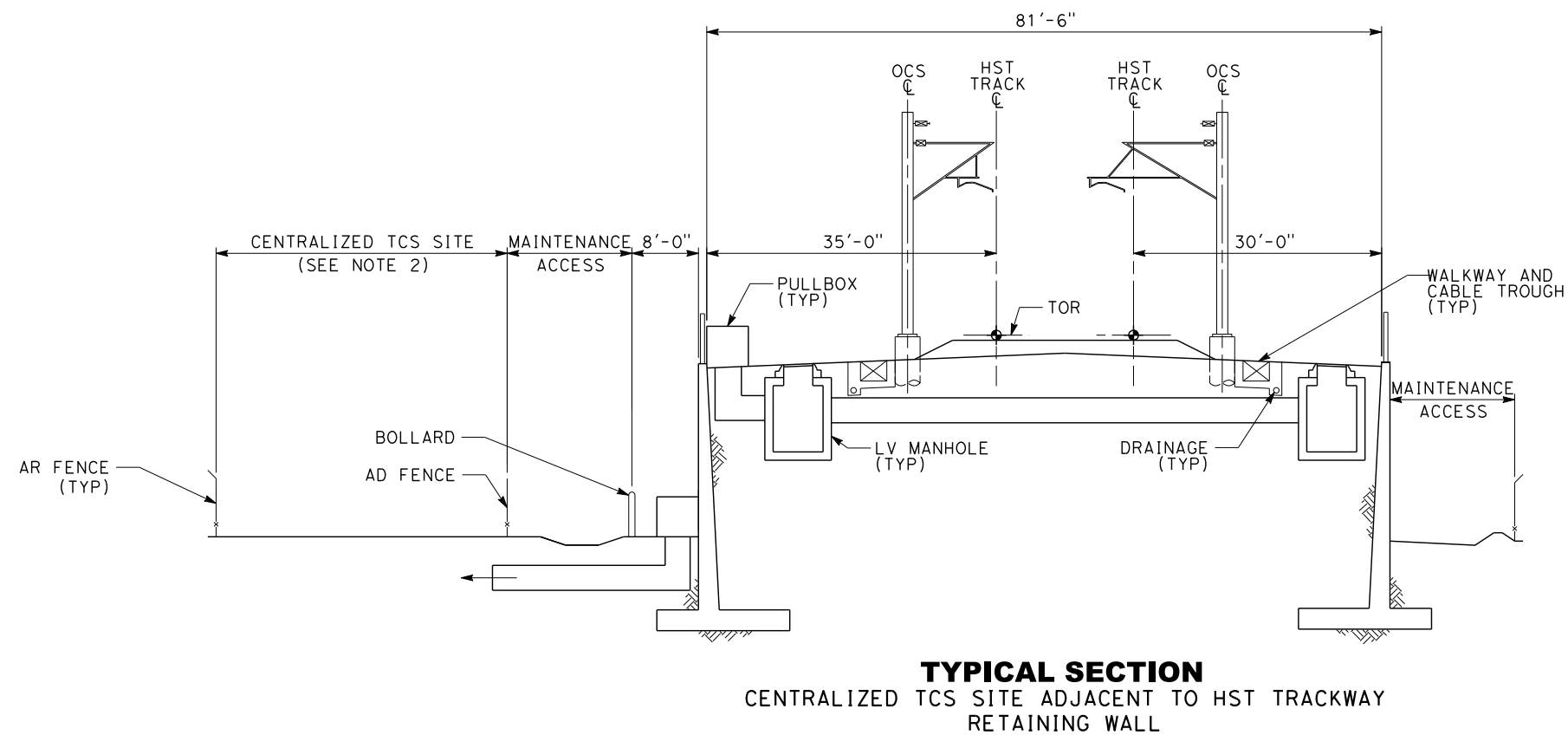




CALIFORNIA HIGH-SPEED TRAIN PROJECT
AUTOMATIC TRAIN DIRECTIVE

SYSTEMS SITE
TCS
TRENCH

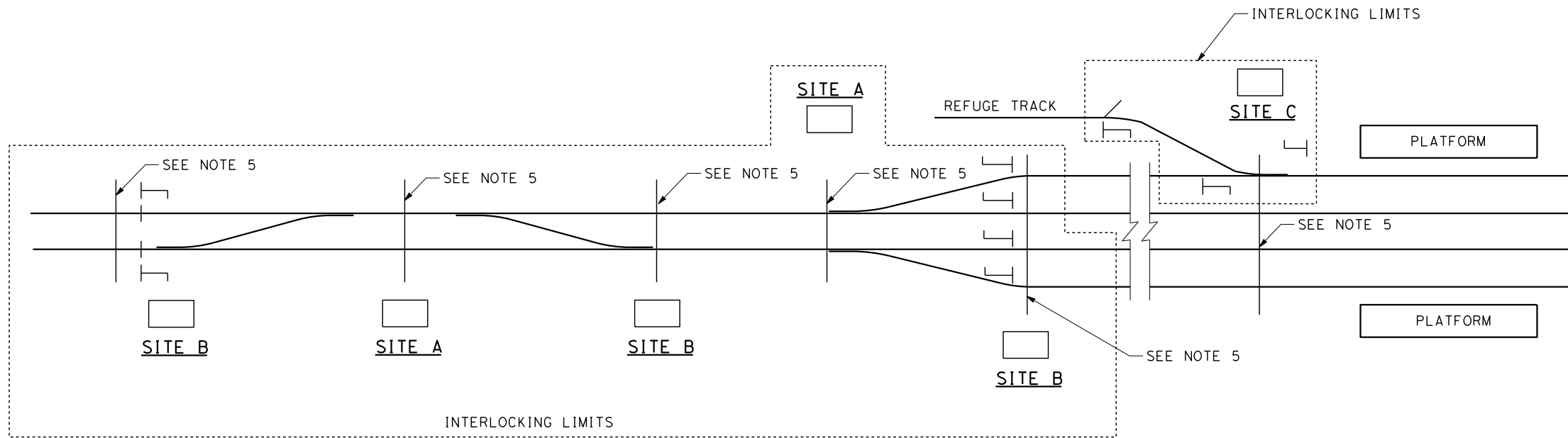
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| CONTRACT NO. |
| DRAWING NO. DD-TC-102 |
| SCALE NO SCALE |
| SHEET NO. |

1. FOR RETAINED-FILLED TRACKWAYS, REINFORCED CONCRETE RETAINING WALLS SHALL BE USED AT SYSTEMS SITES.
2. TYPICAL CROSS SECTIONAL WIDTH SHOWN SHALL BE PROVIDED FOR MINIMUM LENGTH EQUAL TO THE LONGITUDINAL WIDTH OF THE CENTRALIZED TRAIN CONTROL SITE OR FOR THE LONGITUDINAL DISTANCE BETWEEN FURTHEST AUTOMATIC TRAIN CONTROL SITES AT AN INTERLOCKING.
3. FOR TRAIN CONTROL SYSTEM SITE REQUIREMENTS REFER TO TYPICAL TRAIN CONTROL SITES LAYOUT DIRECTIVE DRAWINGS.
4. A LOW VOLTAGE UNDERTRACK DUCTBANK WITH 2 LOW VOLTAGE MANHOLES PROVIDED AT EACH SYSTEMS SITE. REFER TO COMMUNICATIONS DESIGN CRITERIA MANUAL AND DIRECTIVE DRAWINGS FOR LOW VOLTAGE UNDERTRACK CONDUIT DUCTBANK AND MANHOLE REQUIREMENTS.
5. FOR ACCESS RESTRICTION FENCING AND BERM DETAILS, REFER TO CIVIL DIRECTIVE DRAWINGS.
6. TRACK SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN. FOR SITE DRAINAGE REQUIREMENTS REFER TO DRAINAGE DIRECTIVE DRAWINGS.
7. FOR ACCESS ROADS, ACCESS GATE AND ACCESS TO TRACKWAY REQUIREMENTS REFER TO SAFETY AND SECURITY DESIGN REQUIREMENTS FOR INFRASTRUCTURE ELEMENTS AND CIVIL DESIGN CRITERIA.



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| | | | | | | DESIGNED BY I. MUFTIC |   | CALIFORNIA HIGH-SPEED TRAIN PROJECT TRAIN CONTROL SYSTEM DIRECTIVE | | CONTRACT NO. |
| | | | | | | DRAWN BY V. LAVERDE | | | | DRAWING NO. DD-TC-103 |
| | | | | | | CHECKED BY B. MCNALLY | | | | SCALE NO SCALE |
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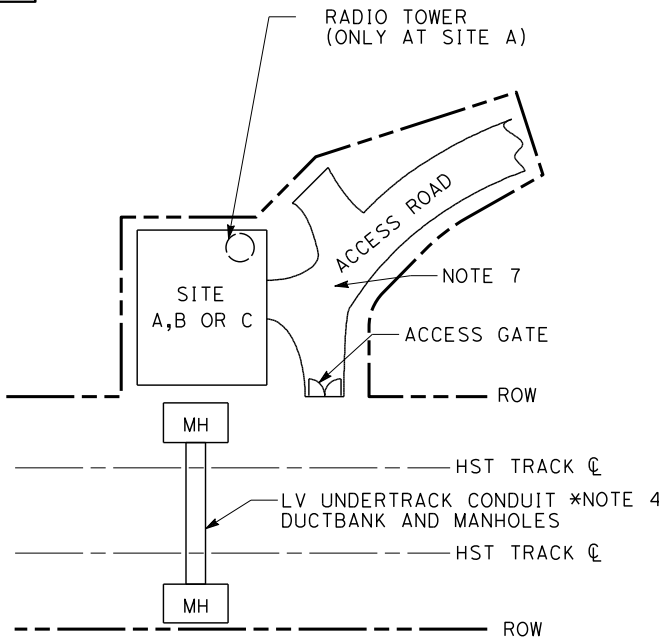
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PLAN

NOTES:

1. SITES A AND B MAY BE LOCATED ON EITHER SIDE OF THE TRACK.
2. WHERE POSSIBLE, FOR SITES A AND B, ALTERNATIVES SHALL BE PROVIDED ON THE OPPOSITE SIDE OF THE TRACK.
3. SITE A WILL ACCOMMODATE TRAIN CONTROL SYSTEM EQUIPMENT, COMMUNICATIONS SYSTEM EQUIPMENT WITH THE RADIO TOWER, AND WAYSIDE POWER CONTROL (WPC) EQUIPMENT.
4. AN ACCESS ROAD AND AN ACCESS GATE SHALL BE PROVIDED FOR EACH SITE PER THE CIVIL DESIGN CRITERIA.
5. AN ASSEMBLY, CONSISTING OF A LOW VOLTAGE UNDERTRACK DUCTBANK WITH 2 LOW VOLTAGE MANHOLES, SHALL BE PROVIDED AT EACH TRAIN CONTROL SITE. REFER TO COMMUNICATIONS DRAWINGS FOR LOW VOLTAGE UNDERTRACK CONDUIT DUCTBANK AND MANHOLE DETAIL REQUIREMENTS.
6. FOR NUMBER OF CONDUITS REFER TO COMMUNICATIONS DESIGN CRITERIA AND DRAWING "TYPICAL CROSS SECTION SYSTEMS LOW-VOLTAGE CONDUIT DUCTBANK".
7. ACCESS ROADS AND ACCESS GATES ARE SHOWN FOR INFORMATION ONLY. REFER TO CIVIL DESIGN CRITERIA FOR ACCESS ROADS AND ACCESS GATES DETAIL REQUIREMENTS.



SITE A, B OR C

WITH LOW-VOLTAGE UNDERTRACK CONDUIT DUCTBANK, ACCESS ROADS AND GATES

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| DRAWN BY V. LAVERDE |
| CHECKED BY B. MCNALLY |
| IN CHARGE B. BANKS |
| DATE 8/29/2014 |

PARSONS
BRINCKERHOFF



CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

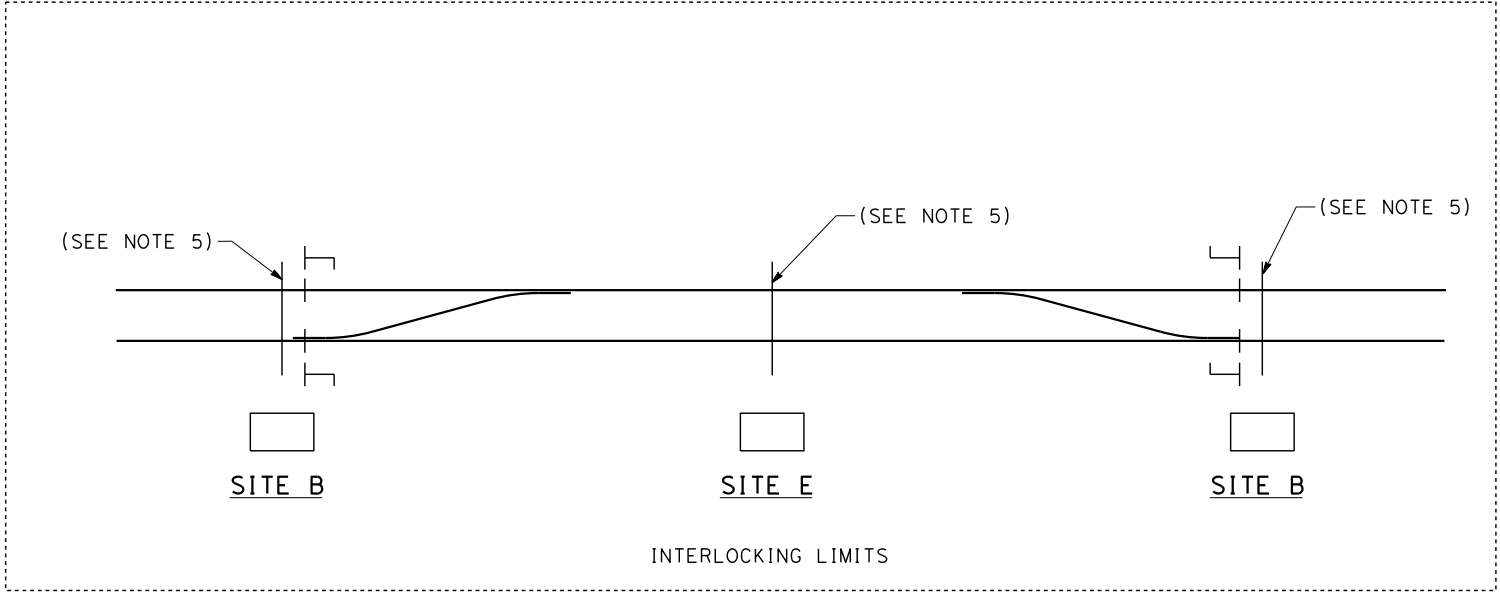
CALIFORNIA HIGH-SPEED TRAIN PROJECT
TRAIN CONTROL DIRECTIVE

TYPICAL TCS SITES
LAYOUT AT STATION AND INTERLOCKINGS

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| CONTRACT NO. |
| DRAWING NO. DD-TC-200 |
| SCALE NO SCALE |
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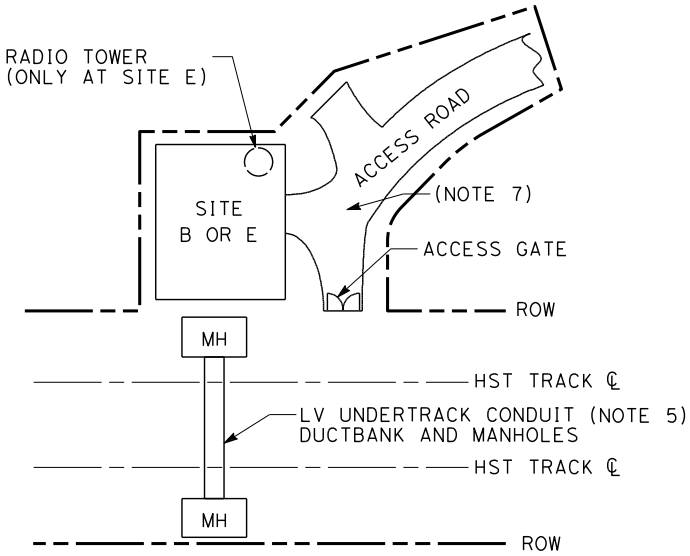
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NOTES:

1. SITES B AND E MAY BE LOCATED ON EITHER SIDE OF THE TRACK.
2. WHERE POSSIBLE, FOR SITES B AND E, ALTERNATIVES SHALL BE PROVIDED ON THE OPPOSITE SIDE OF THE TRACK.
3. SITE E WILL ACCOMMODATE TRAIN CONTROL SYSTEM EQUIPMENT, COMMUNICATIONS SYSTEM EQUIPMENT WITH THE RADIO TOWER, AND WAYSIDE POWER CONTROL (WPC) EQUIPMENT.
4. AN ACCESS ROAD AND AN ACCESS GATE SHALL BE PROVIDED FOR EACH SITE PER THE CIVIL DESIGN CRITERIA.
5. AN ASSEMBLY, CONSISTING OF A LOW VOLTAGE UNDERTRACK DUCTBANK WITH 2 LOW VOLTAGE MANHOLES, SHALL BE PROVIDED AT EACH TRAIN CONTROL SITE. REFER TO COMMUNICATIONS DRAWINGS FOR LOW VOLTAGE UNDERTRACK CONDUIT DUCTBANK AND MANHOLE DETAIL REQUIREMENTS.
6. FOR NUMBER OF CONDUITS REFER TO COMMUNICATIONS DESIGN CRITERIA AND DRAWING "TYPICAL CROSS SECTION SYSTEMS LOW-VOLTAGE CONDUIT DUCTBANK".
7. ACCESS ROADS AND ACCESS GATES ARE SHOWN FOR INFORMATION ONLY. REFER TO CIVIL DESIGN CRITERIA FOR ACCESS ROADS AND ACCESS GATES DETAIL REQUIREMENTS.



SITE B OR E

WITH LOW-VOLTAGE UNDERTRACK CONDUIT DUCTBANK, ACCESS ROADS AND GATES

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| DESIGNED BY I. MUF TIC |
| DRAWN BY V. LAVERDE |
| CHECKED BY B. MCNALLY |
| IN CHARGE B. BANKS |
| DATE 8/29/2014 |

**PARSONS
BRINCKERHOFF**



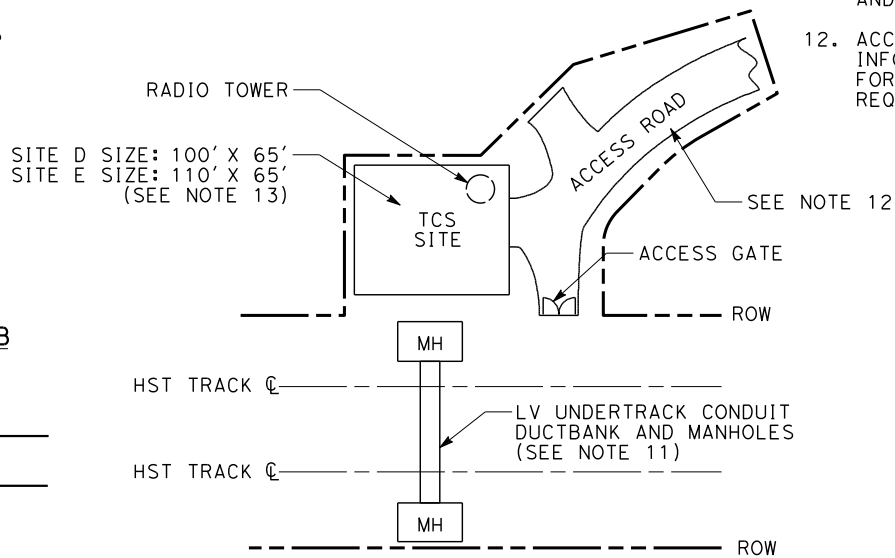
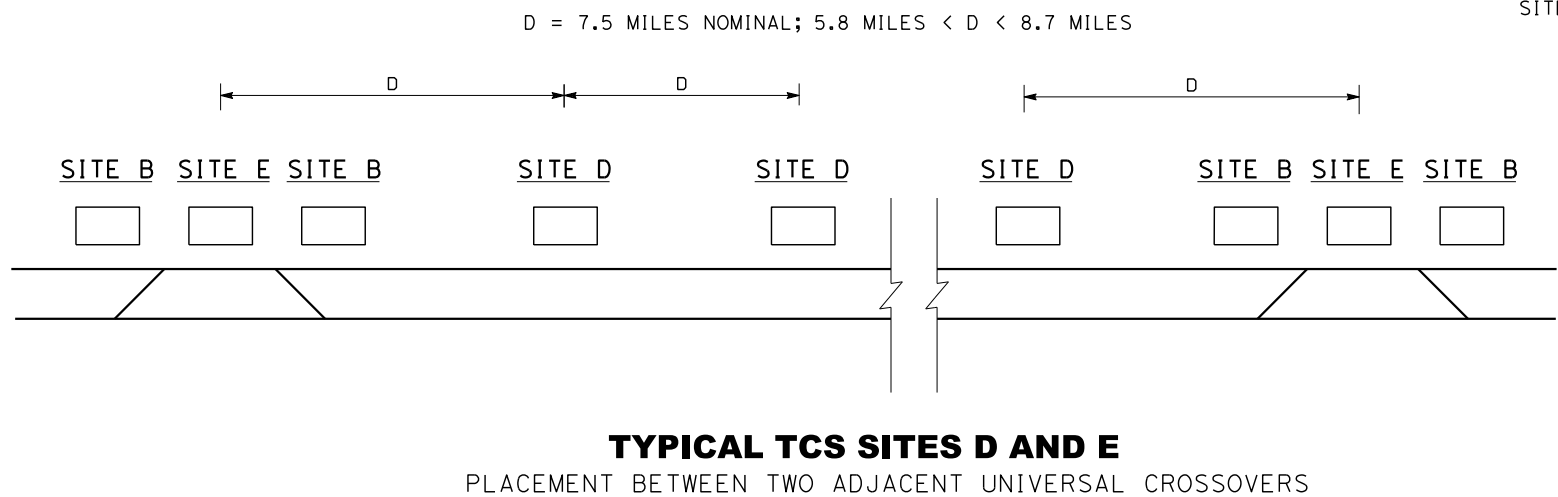
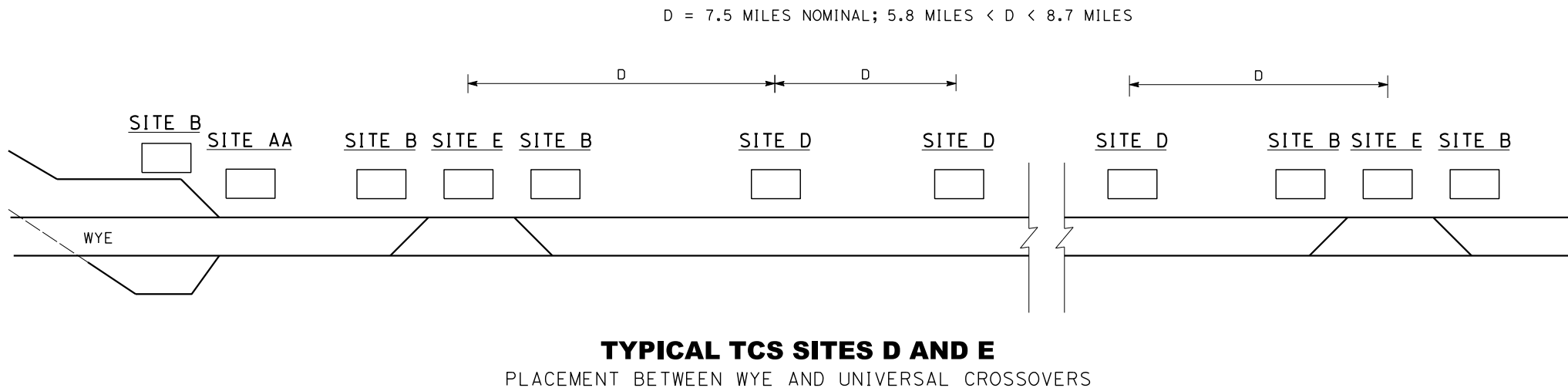
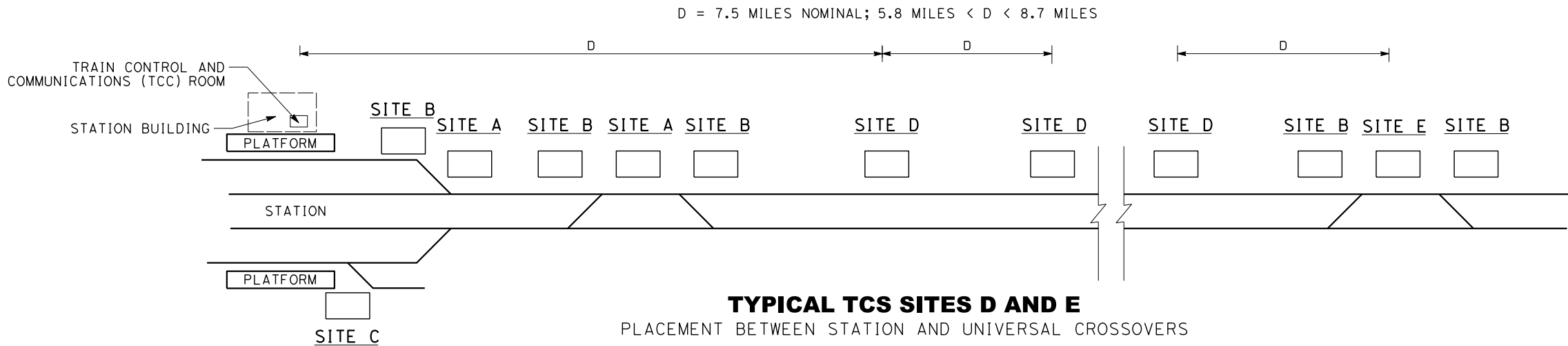
CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

**CALIFORNIA HIGH-SPEED TRAIN PROJECT
TRAIN CONTROL DIRECTIVE**

TYPICAL TCS SITES AND
INTERLOCKINGS LAYOUT AT UNIVERSAL CROSSEOVERS

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| CONTRACT NO. |
| DRAWING NO. DD-TC-201 |
| SCALE NO SCALE |
| SHEET NO. |

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NOTES:

1. THIS DRAWING SHOWS A TYPICAL SPACING BETWEEN STATION TRAIN CONTROL AND COMMUNICATIONS (TCC) ROOM, D SITES, AND E SITES AT UNIVERSAL CROSSOVERS.
2. IF THE STATION DESIGN IS NOT AVAILABLE, THE CENTER LINE OF PLATFORM SHALL BE USED AS A REFERENCE POINT INSTEAD OF THE EXACT LOCATION OF THE TCC ROOM.
3. D SITES SHALL BE PROVIDED AT THE NOMINAL DISTANCE OF 7.5 MILES BETWEEN STATION TCC ROOM AND ADJACENT SITE D, BETWEEN 2 ADJACENT D SITES, AND BETWEEN ADJACENT D SITE AND E SITE AT UNIVERSAL CROSSOVERS.
4. MINIMUM SPACING BETWEEN STATION TCC ROOM AND ADJACENT SITE D, BETWEEN 2 ADJACENT D SITES, AND BETWEEN ADJACENT D SITE AND E SITE AT UNIVERSAL CROSSOVERS IS 5.8 MILES.
5. MAXIMUM SPACING BETWEEN STATION TCC ROOM AND ADJACENT SITE D, BETWEEN 2 ADJACENT D SITES, AND BETWEEN ADJACENT D SITE AND E SITE AT UNIVERSAL CROSSOVERS IS 8.7 MILES.
6. D SITES MAY BE LOCATED ON EITHER SIDE OF TRACK.
7. FOR EACH D SITE, AN ALTERNATIVE SHALL BE PROVIDED.
8. IF THERE IS AN EXISTING STAND ALONE RADIO SITE (SRS) WITHIN THE SPACING LIMITS FOR A D SITE, THE SRS CAN BE REPLACED WITH A NEW D SITE.
9. IF THERE IS A TRACTION POWER FACILITY (TPF) WITHIN THE SPACING LIMITS FOR AN ATC D SITE, THE ATC D SITE CAN BE PLACED CLOSE TO THE TPF SITE TO UTILIZE THE SAME ACCESS ROAD.
10. THIS CRITERIA IS NOT APPLICABLE FOR TUNNELS LONGER THAN 6 MILES AND THOSE WILL BE CONSIDERED AS A SPECIAL CASE.
11. AN ASSEMBLY, CONSISTING OF A LOW VOLTAGE UNDERTRACK DUCTBANK WITH 2 LOW VOLTAGE MANHOLES, SHALL BE PROVIDED AT EACH TRAIN CONTROL SITE. REFER TO COMMUNICATIONS DRAWINGS FOR LOW VOLTAGE UNDERTRACK CONDUIT DUCTBANK AND MANHOLE DETAIL REQUIREMENTS.
12. ACCESS ROADS AND ACCESS GATES ARE SHOWN FOR INFORMATION ONLY. REFER TO CIVIL DESIGN CRITERIA FOR ACCESS ROADS AND ACCESS GATES DETAIL REQUIREMENTS.

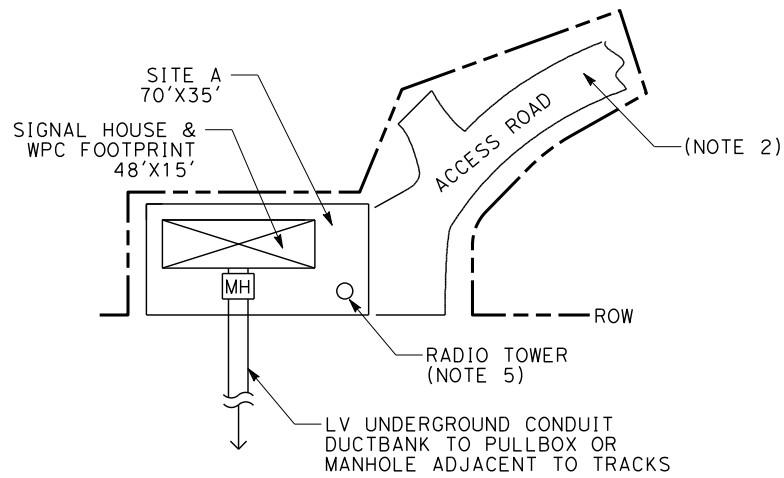
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| DESIGNED BY I. MUFTIC |
| DRAWN BY V. LAVERDE |
| CHECKED BY B. MCNALLY |
| IN CHARGE B. BANKS |
| DATE 8/29/2014 |

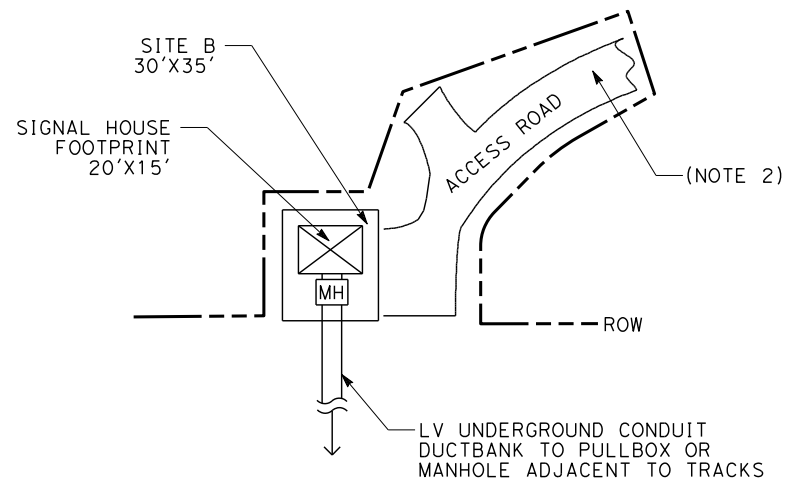


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| CALIFORNIA HIGH-SPEED TRAIN PROJECT TRAIN CONTROL DIRECTIVE | | CONTRACT NO. |
| TYPICAL TCS SITES D AND E CONFIGURATION | | DRAWING NO. DD-TC-202 |
| | | SCALE NO SCALE |
| | | SHEET NO. |

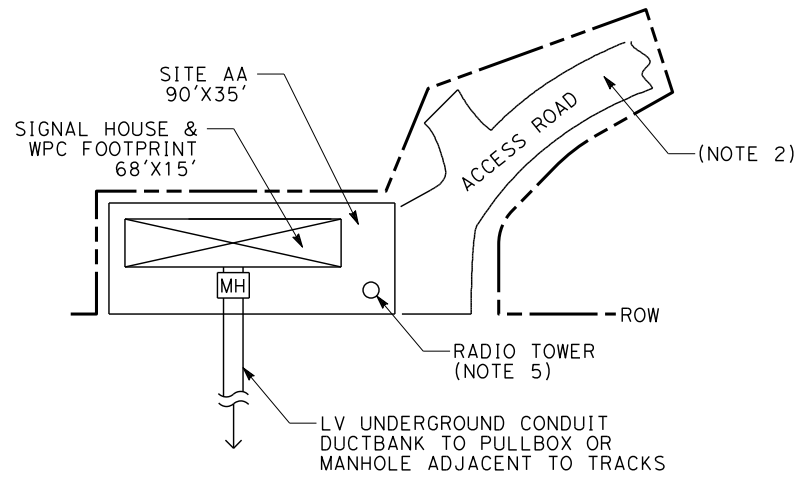
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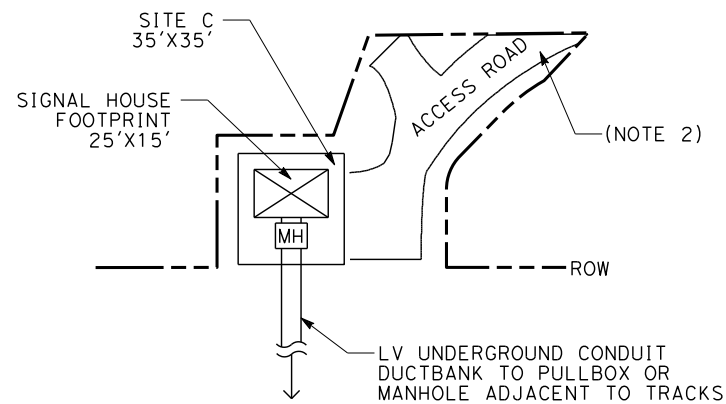
SITE A TYPICAL CONFIGURATION



SITE B TYPICAL CONFIGURATION



SITE AA TYPICAL CONFIGURATION



SITE C TYPICAL CONFIGURATION

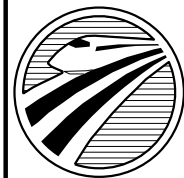
NOTES:

1. SITES A AND AA WILL ACCOMMODATE TRAIN CONTROL, COMMUNICATIONS SYSTEM (WITH RADIO TOWER), AND WAYSIDE POWER CONTROL (WPC) EQUIPMENT. A SEPARATE ROOM OF 25 SQUARE FEET SHALL BE RESERVED FOR WPC WITHIN THE SIGNAL HOUSE.
2. REFER TO COMMUNICATIONS DRAWINGS FOR DUCTBANK, MANHOLE CROSS SECTIONS, DETAILS AND ELEVATIONS.
3. FOR NUMBERS OF CONDUITS REFER TO COMMUNICATION DESIGN CRITERIA AND DRAWING "TYPICAL CROSS SECTION SYSTEMS LOW-VOLTAGE CONDUIT DUCTBANK".
4. FOR RADIO TOWER REQUIREMENTS AND CLEARANCES REFER TO COMMUNICATIONS DESIGN CRITERIA AND DRAWINGS.

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| DESIGNED BY I. MUFTIC |
| DRAWN BY V. LAVERDE |
| CHECKED BY B. MCNALLY |
| IN CHARGE B. BANKS |
| DATE 8/29/2014 |

PARSONS
BRINCKERHOFF



CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

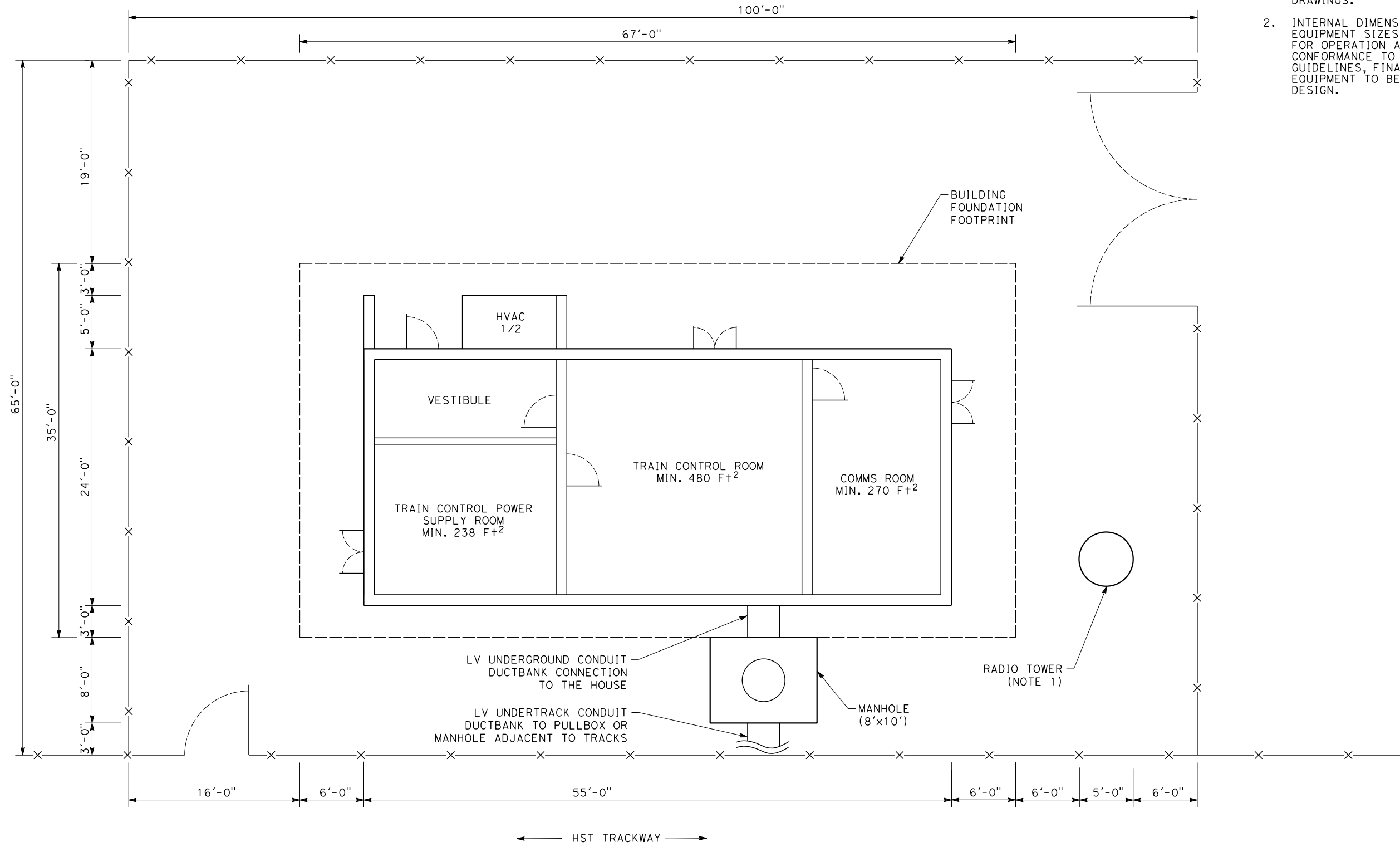
CALIFORNIA HIGH-SPEED TRAIN PROJECT
TRAIN CONTROL DIRECTIVE

TYPICAL TCS SITES
A, AA, B, & C LAYOUT

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| CONTRACT NO. |
| DRAWING NO. DD-TC-203 |
| SCALE NO SCALE |
| SHEET NO. |

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NOTES:

1. FOR RADIO TOWER REQUIREMENTS AND CLEARANCES REFER TO COMMUNICATIONS DESIGN CRITERIA AND DRAWINGS.
2. INTERNAL DIMENSIONS ARE SHOWN FOR TYPICAL EQUIPMENT SIZES, CLEARANCES AND ACCESSIBILITY FOR OPERATION AND MAINTENANCE OF EQUIPMENT CONFORMANCE TO RELEVANT CODES, STANDARDS, AND GUIDELINES, FINAL DIMENSIONS AND CONFIGURATION OF EQUIPMENT TO BE DETERMINED DURING FINAL SYSTEMS DESIGN.

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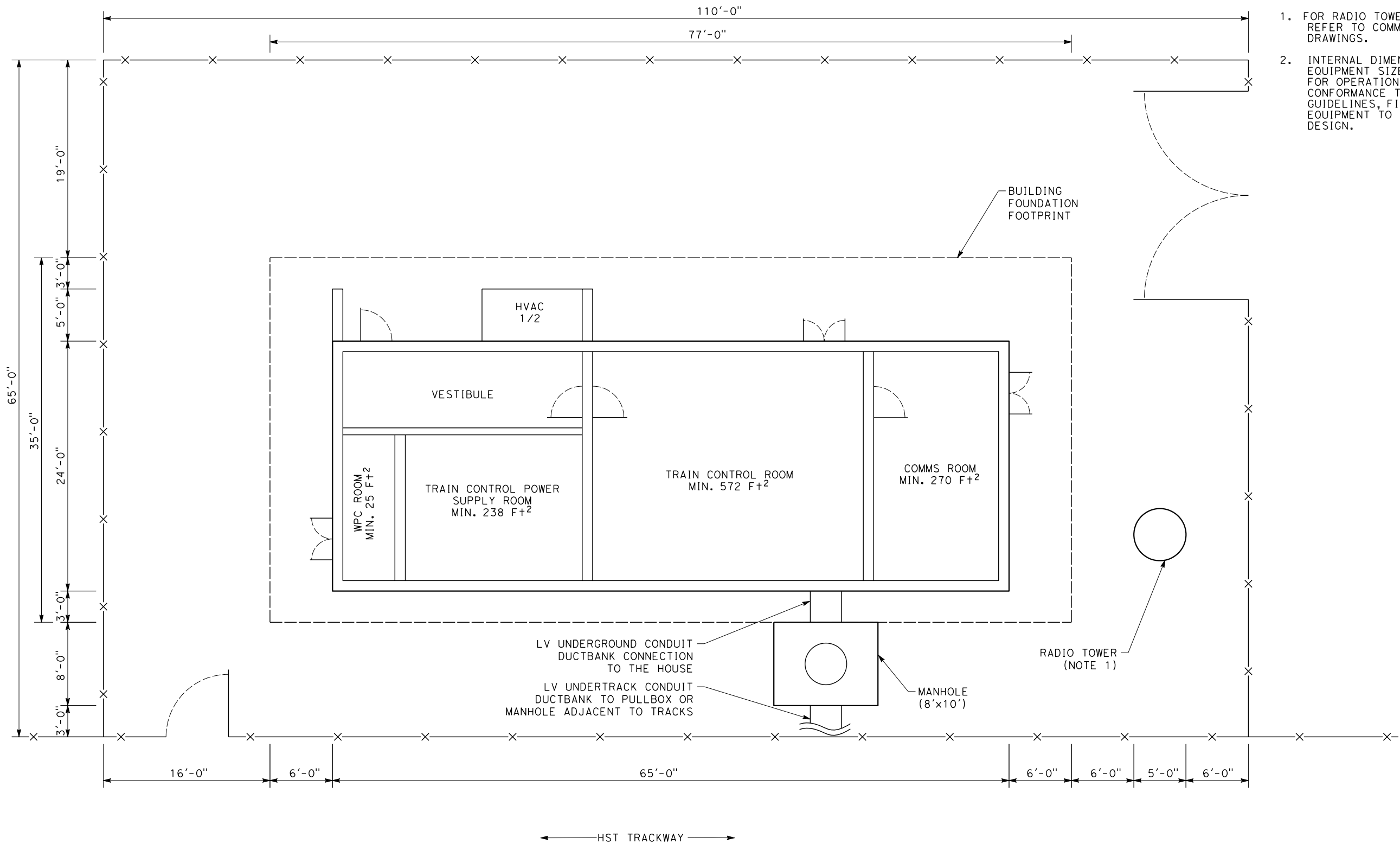
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| DRAWN BY V. LAVERDE |
| CHECKED BY B. MCNALLY |
| IN CHARGE B. BANKS |
| DATE 8/29/2014 |



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| CALIFORNIA HIGH-SPEED TRAIN PROJECT TRAIN CONTROL DIRECTIVE |
| TYPICAL TCS SITE D LAYOUT |

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| CONTRACT NO. |
| DRAWING NO. DD-TC-204 |
| SCALE NO SCALE |
| SHEET NO. |

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- NOTES:**
1. FOR RADIO TOWER REQUIREMENTS AND CLEARANCES REFER TO COMMUNICATIONS DESIGN CRITERIA AND DRAWINGS.
 2. INTERNAL DIMENSIONS ARE SHOWN FOR TYPICAL EQUIPMENT SIZES, CLEARANCES AND ACCESSIBILITY FOR OPERATION AND MAINTENANCE OF EQUIPMENT CONFORMANCE TO RELEVANT CODES, STANDARDS, AND GUIDELINES, FINAL DIMENSIONS AND CONFIGURATION OF EQUIPMENT TO BE DETERMINED DURING FINAL SYSTEMS DESIGN.

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| DRAWN BY V. LAVERDE |
| CHECKED BY B. MCNALLY |
| IN CHARGE B. BANKS |
| DATE 8/29/2014 |



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| CALIFORNIA HIGH-SPEED TRAIN PROJECT TRAIN CONTROL DIRECTIVE |
| TYPICAL TCS SITE E LAYOUT |

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| CONTRACT NO. |
| DRAWING NO. DD-TC-205 |
| SCALE NO SCALE |
| SHEET NO. |

California High-Speed Rail Authority



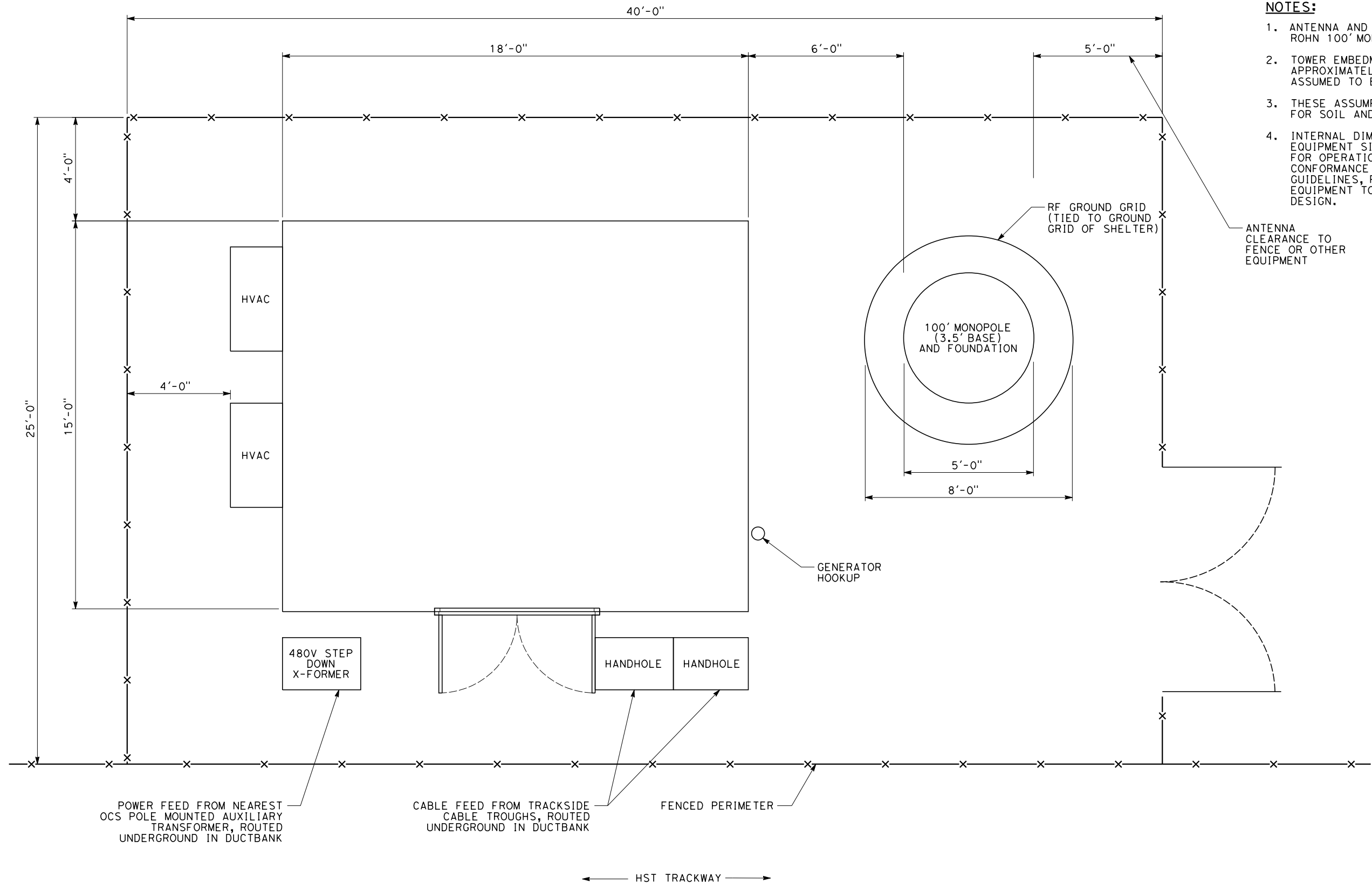
RFP No.: HSR 13-57

**Request for Proposals for Design-Build
Services for Construction Package 2-3**

**Book III, Part B.1
Directive Drawings**

Communications

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- NOTES:**
1. ANTENNA AND SUPPORT DIMENSIONS ARE BASED ON ROHN 100' MONOPOLE T100HA.
 2. TOWER EMBEDMENT DEPTH ASSUMED TO BE APPROXIMATELY 25 FEET TOWER BASE AND FOUNDATION ASSUMED TO BE 5 FOOT DIAMETER.
 3. THESE ASSUMPTIONS SHALL BE VALIDATED BY DESIGN FOR SOIL AND ENVIRONMENTAL CONDITIONS.
 4. INTERNAL DIMENSIONS ARE SHOWN FOR TYPICAL EQUIPMENT SIZES. CLEARANCES AND ACCESSIBILITY FOR OPERATION AND MAINTENANCE OF EQUIPMENT AND CONFORMANCE TO RELEVANT CODES, STANDARDS, AND GUIDELINES, FINAL DIMENSIONS AND CONFIGURATION OF EQUIPMENT TO BE DETERMINED DURING FINAL SYSTEMS DESIGN.

ANTENNA
CLEARANCE TO
FENCE OR OTHER
EQUIPMENT

RF GROUND GRID
(TIED TO GROUND
GRID OF SHELTER)

100' MONOPOLE
(3.5' BASE)
AND FOUNDATION

GENERATOR
HOOKUP

HANDHOLE

HANDHOLE

480V STEP
DOWN
X-FORMER

POWER FEED FROM NEAREST
OCS POLE MOUNTED AUXILIARY
TRANSFORMER, ROUTED
UNDERGROUND IN DUCTBANK

CABLE FEED FROM TRACKSIDE
CABLE TROUGHS, ROUTED
UNDERGROUND IN DUCTBANK

FENCED PERIMETER

HST TRACKWAY

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DESIGNED BY
C. DALOIA
DRAWN BY
V. LAVERDE
CHECKED BY
B. MCNALLY
IN CHARGE
B. BANKS
DATE
8/29/2014

**PARSONS
BRINCKERHOFF**



CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

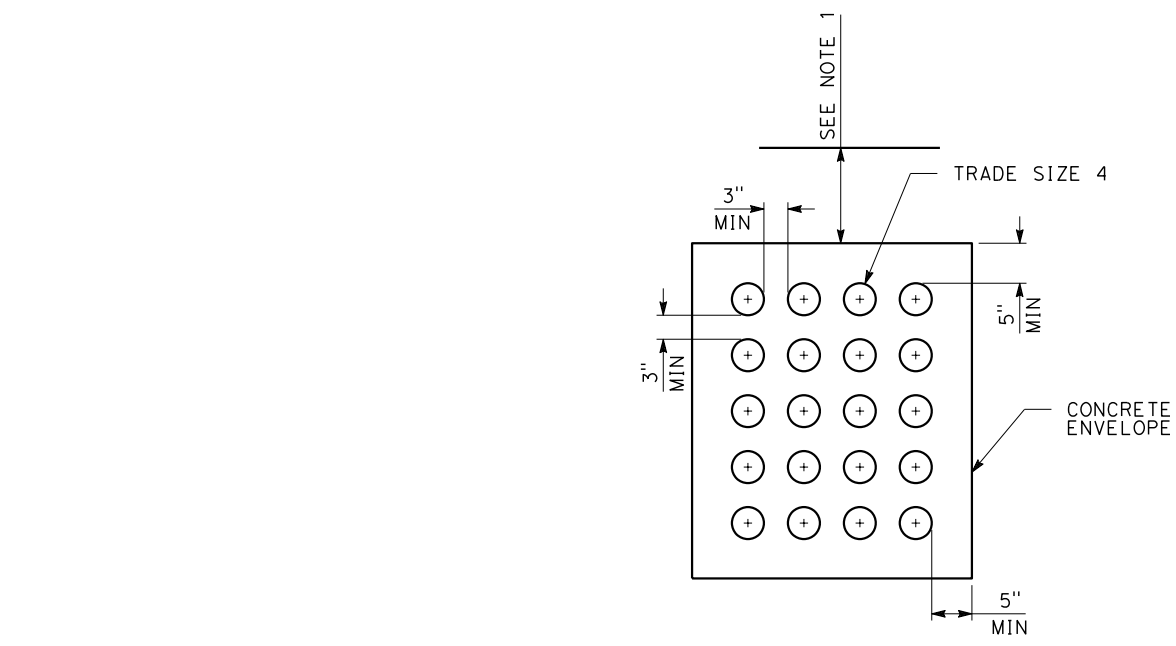
**CALIFORNIA HIGH-SPEED TRAIN PROJECT
COMMUNICATIONS DIRECTIVE**

CONCEPTUAL LAYOUT
COMMUNICATIONS SPACES
PHYSICAL SITE LAYOUT

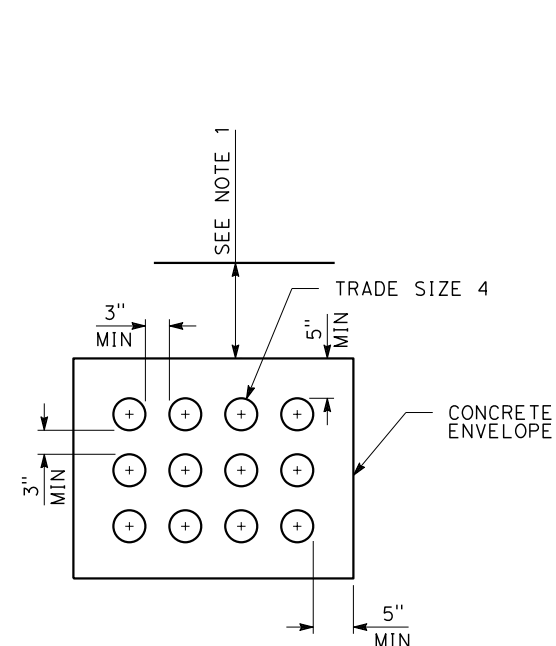
CONTRACT NO.
DRAWING NO.
DD-CO-F080
SCALE
NO SCALE
SHEET NO.

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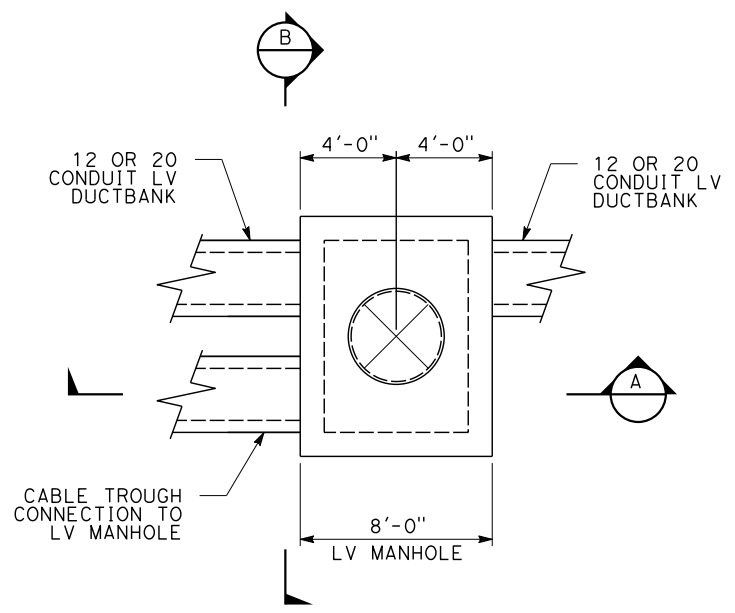
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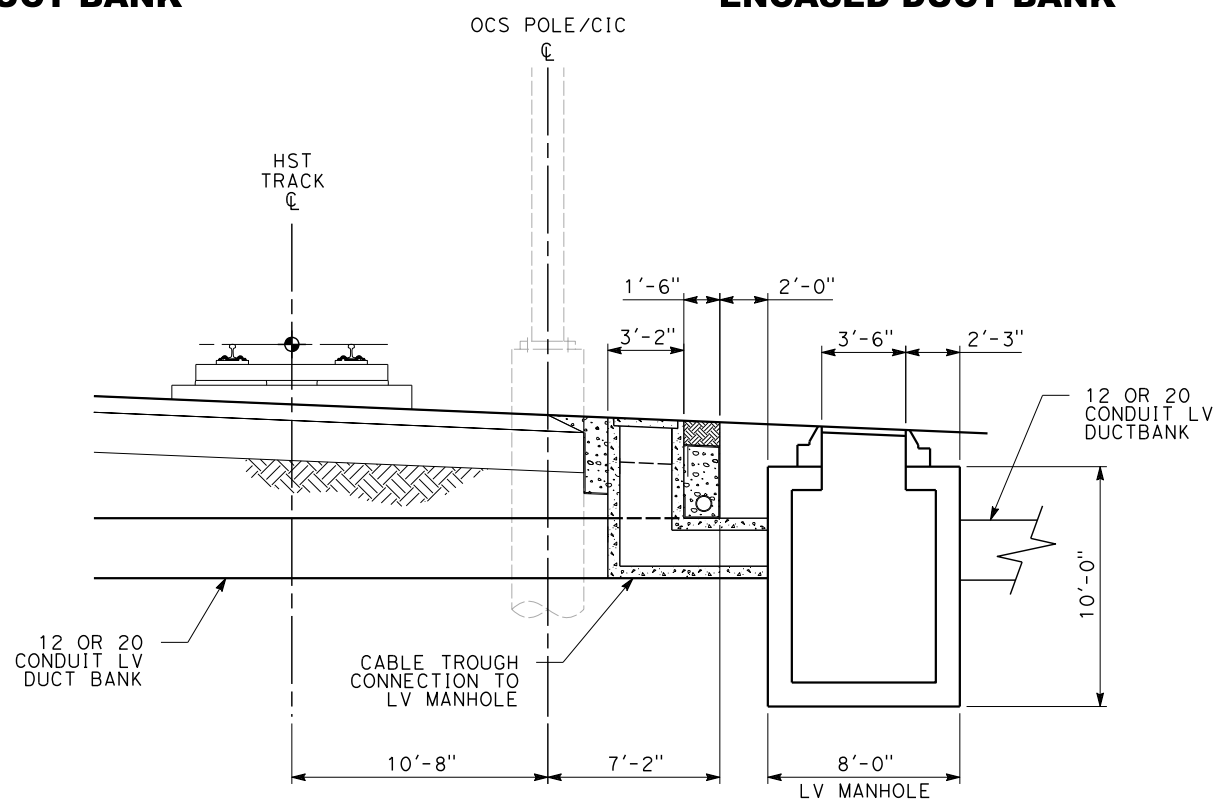
20 CONDUIT CONCRETE
ENCASED DUCT BANK



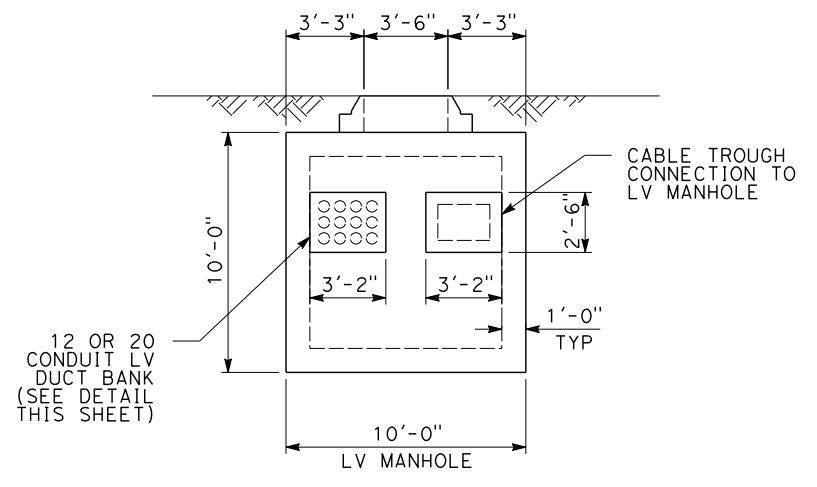
12 CONDUIT CONCRETE
ENCASED DUCT BANK



PLAN



SECTION A



SECTION B

NOTES:

1. CONCRETE ENCASED DUCT BANK TO BE PLACED A MINIMUM 6' BELOW TOP OF RAIL AND MINIMUM 3' BELOW GRADE WHEN NO RAIL IS PRESENT.
2. LOW VOLTAGE DUCT BANK TO BE LOCATED PER THE CRITERIA LISTED IN THE COMMUNICATIONS DESIGN CRITERIA CHAPTER.

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| DESIGNED BY C. DALOIA |
| DRAWN BY V. LAVERDE |
| CHECKED BY B. MCNALLY |
| IN CHARGE B. BANKS |
| DATE 8/29/2014 |

PARSONS
BRINCKERHOFF



CALIFORNIA HIGH-SPEED TRAIN PROJECT
COMMUNICATIONS DIRECTIVE

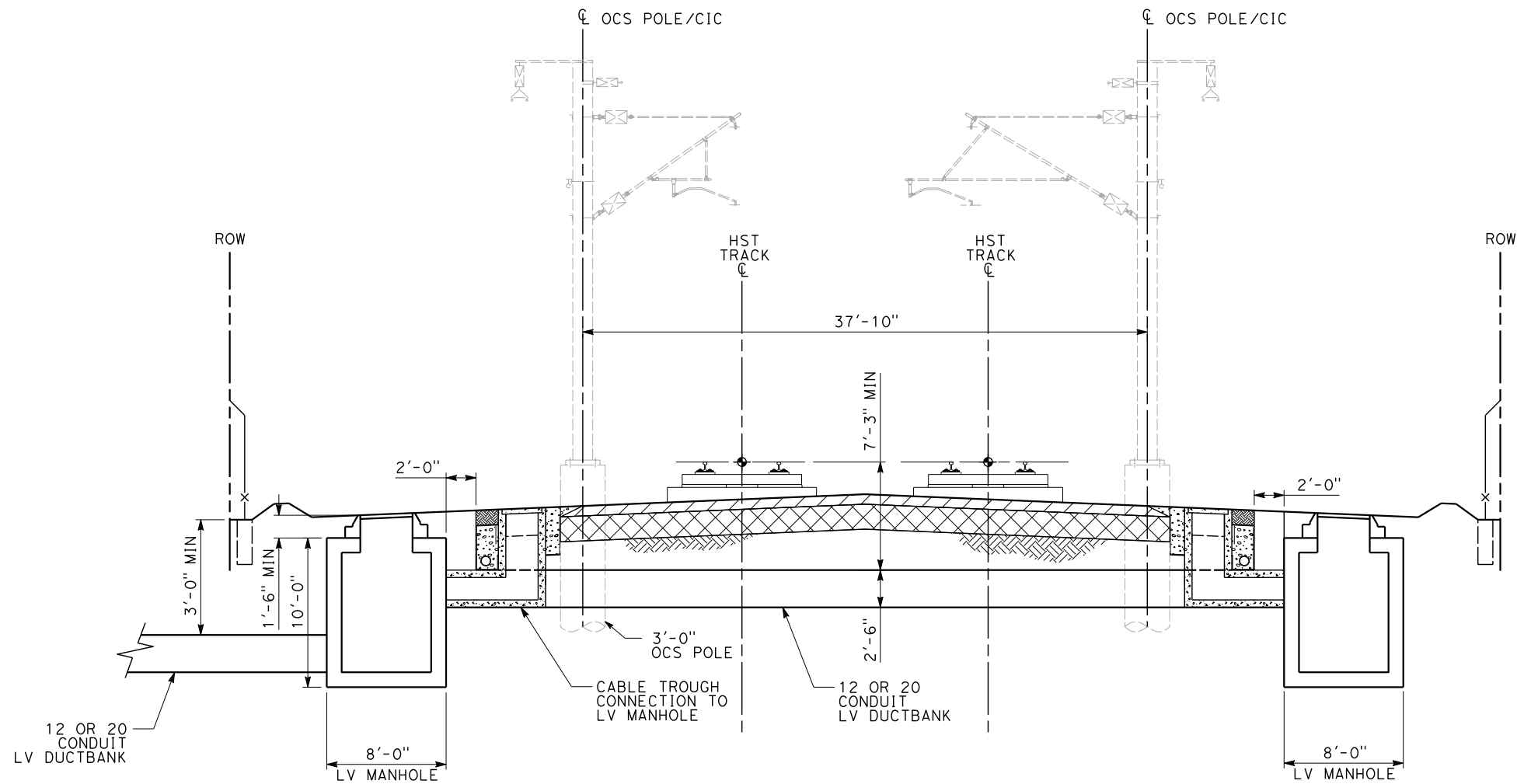
TYPICAL CROSS SECTION
LOW VOLTAGE MANHOLE / CABLE TROUGH / DUCTBANK
DETAILS

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| CONTRACT NO. |
| DRAWING NO. DD-CO-G023 |
| SCALE NO SCALE |
| SHEET NO. |

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NOTES:

1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. MANHOLE SHALL NOT BE ALIGNED WITH OCS FOUNDATION OR FENCE FOOTING.



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| DESIGNED BY B. BANKS |
| DRAWN BY V. HUANTE |
| CHECKED BY C. DALOIA |
| IN CHARGE R. SCHMEDES |
| DATE |

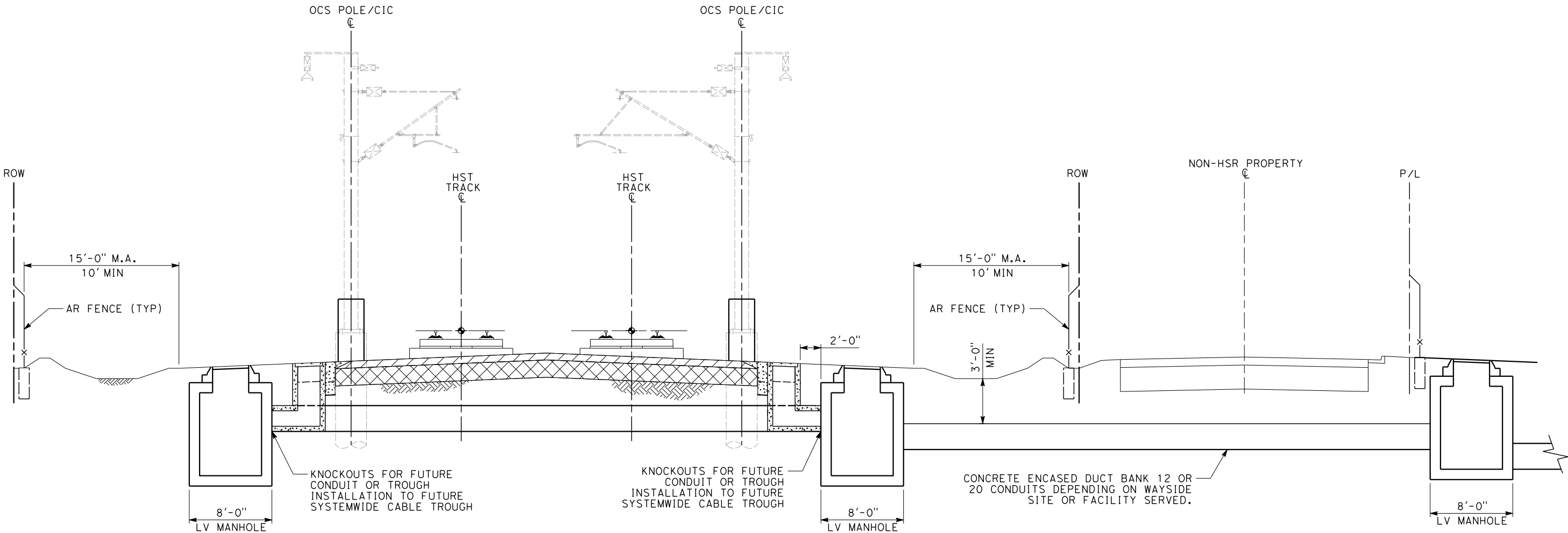


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| CALIFORNIA HIGH-SPEED TRAIN PROJECT COMMUNICATIONS DIRECTIVE TYPICAL CROSS SECTION SYSTEMS LOW-VOLTAGE UNDERTRACK CONDUIT DUCT BANK AT-GRADE |
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| CONTRACT NO. |
| DRAWING NO. DD-CO-G040 |
| SCALE NO SCALE |
| SHEET NO. |

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NOTES:
1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.



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| DESIGNED BY B. BANKS |
| DRAWN BY V. HUANTE |
| CHECKED BY C. DALOIA |
| IN CHARGE R. SCHMEDES |
| DATE 01/24/2014 |

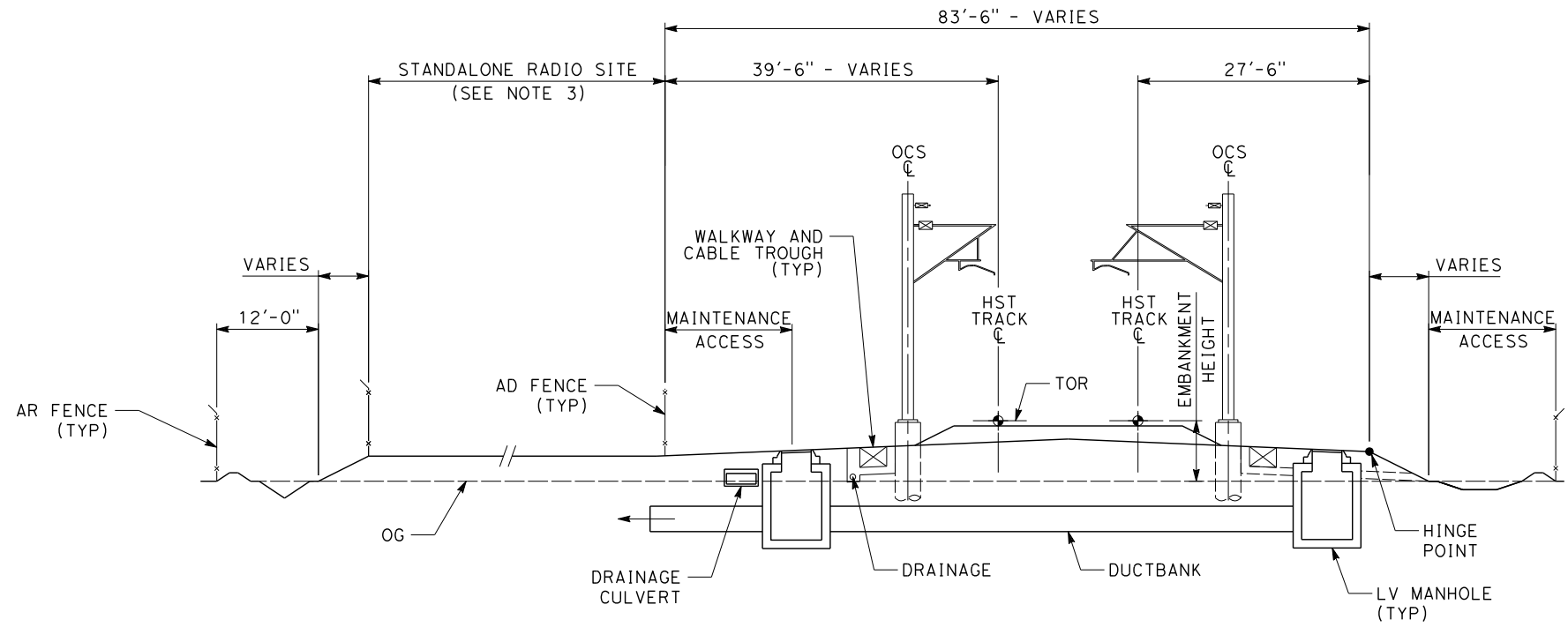


**CALIFORNIA HIGH-SPEED TRAIN PROJECT
COMMUNICATIONS DIRECTIVE**
TYPICAL CROSS SECTION
SYSTEMS LOW-VOLTAGE
UNDER TRACK/UNDERGROUND CONDUIT DUCT BANK
AT-GRADE

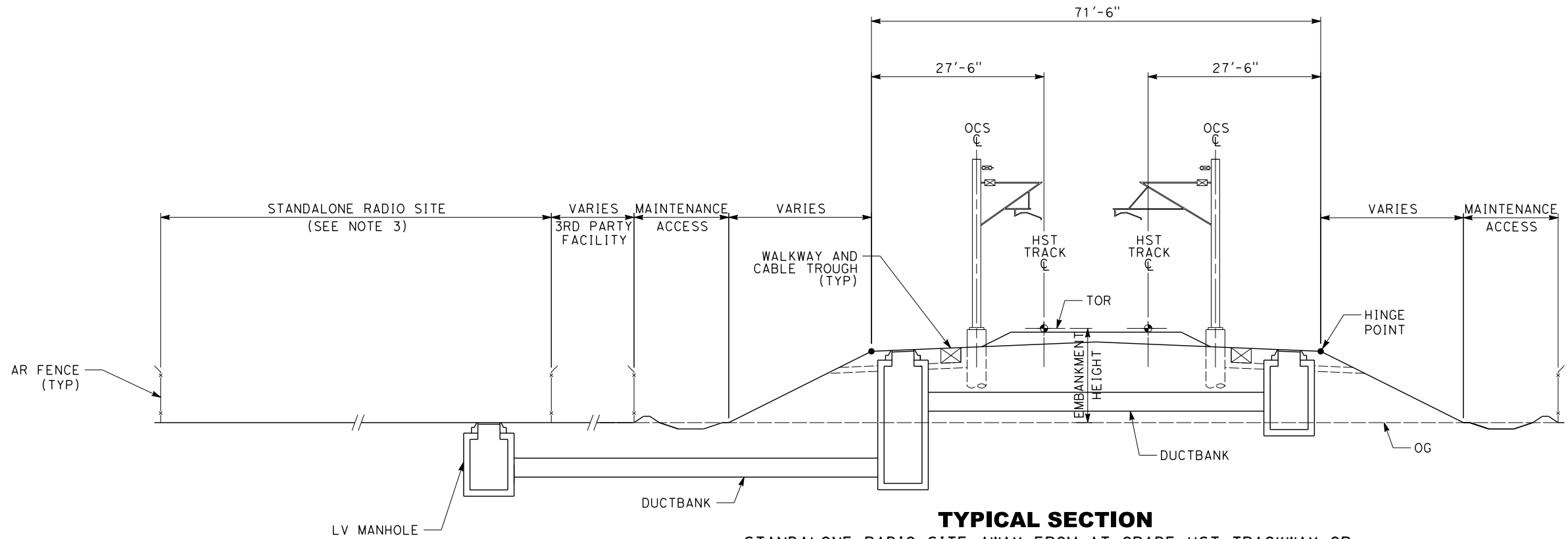
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| CONTRACT NO. |
| DRAWING NO. DD-CO-G041 |
| SCALE NO SCALE |
| SHEET NO. |

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TYPICAL SECTION
STANDALONE RADIO SITE ADJACENT TO AT-GRADE HST TRACKWAY
WITH EMBANKMENT HEIGHT (TOR-OG) \leq 10 FEET



TYPICAL SECTION
STANDALONE RADIO SITE AWAY FROM AT-GRADE HST TRACKWAY OR
EMBANKMENT HEIGHT (TOR-OG) $>$ 10 FEET

NOTES:

1. TYPICAL CROSS-SECTIONAL WIDTH SHOWN SHALL BE PROVIDED FOR A MINIMUM LENGTH EQUAL TO THE LONGITUDINAL DIMENSION OF THE SYSTEMS SITE.
2. FOR ACCESS RESTRICTION FENCING AND BERM DETAILS, REFER TO CIVIL DIRECTIVE DRAWINGS.
3. TRACK SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN. FOR SITE DRAINAGE REQUIREMENTS REFER TO DRAINAGE DIRECTIVE DRAWINGS.
4. FOR ACCESS ROADS, ACCESS GATE AND ACCESS TO TRACKWAY REQUIREMENTS REFER TO SAFETY AND SECURITY DESIGN REQUIREMENTS FOR INFRASTRUCTURE ELEMENTS AND CIVIL DESIGN CRITERIA.
5. FOR STANDALONE RADIO SITE REQUIREMENTS REFER TO COMMUNICATIONS SYSTEMS SITE REQUIREMENTS.
6. A LOW VOLTAGE UNDERTRACK DUCTBANK WITH 2 LOW VOLTAGE MANHOLES TO BE PROVIDED AT SYSTEMS SITE. REFER TO COMMUNICATIONS DESIGN CRITERIA MANUAL AND DIRECTIVE DRAWINGS FOR LOW VOLTAGE UNDERTRACK CONDUIT DUCTBANK AND MANHOLE REQUIREMENTS.
7. SYSTEM SITES AWAY FROM TRACKWAY, SEPARATED BY A THIRD-PARTY RIGHT-OF-WAY ARE UNDESIRABLE. AWAY CROSS-SECTION IS ONLY APPLICABLE IF ADJACENT SOLUTION IS DEMONSTRATED TO VIOLATE SITE SPACING REQUIREMENTS OR OTHER CRITICAL CRITERIA.
8. LOW VOLTAGE UNDERGROUND DUCTBANK AND MANHOLE TO BE PROVIDED UNDERNEATH 3RD PARTY RIGHT-OF-WAY TO CONNECT TO LOW VOLTAGE UNDERTRACK MANHOLES AND DUCTBANK.

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| DESIGNED BY C. DALOIA |
| DRAWN BY V. LAVERDE |
| CHECKED BY B. MCNALLY |
| IN CHARGE B. BANKS |
| DATE 8/29/2014 |

**PARSONS
BRINCKERHOFF**



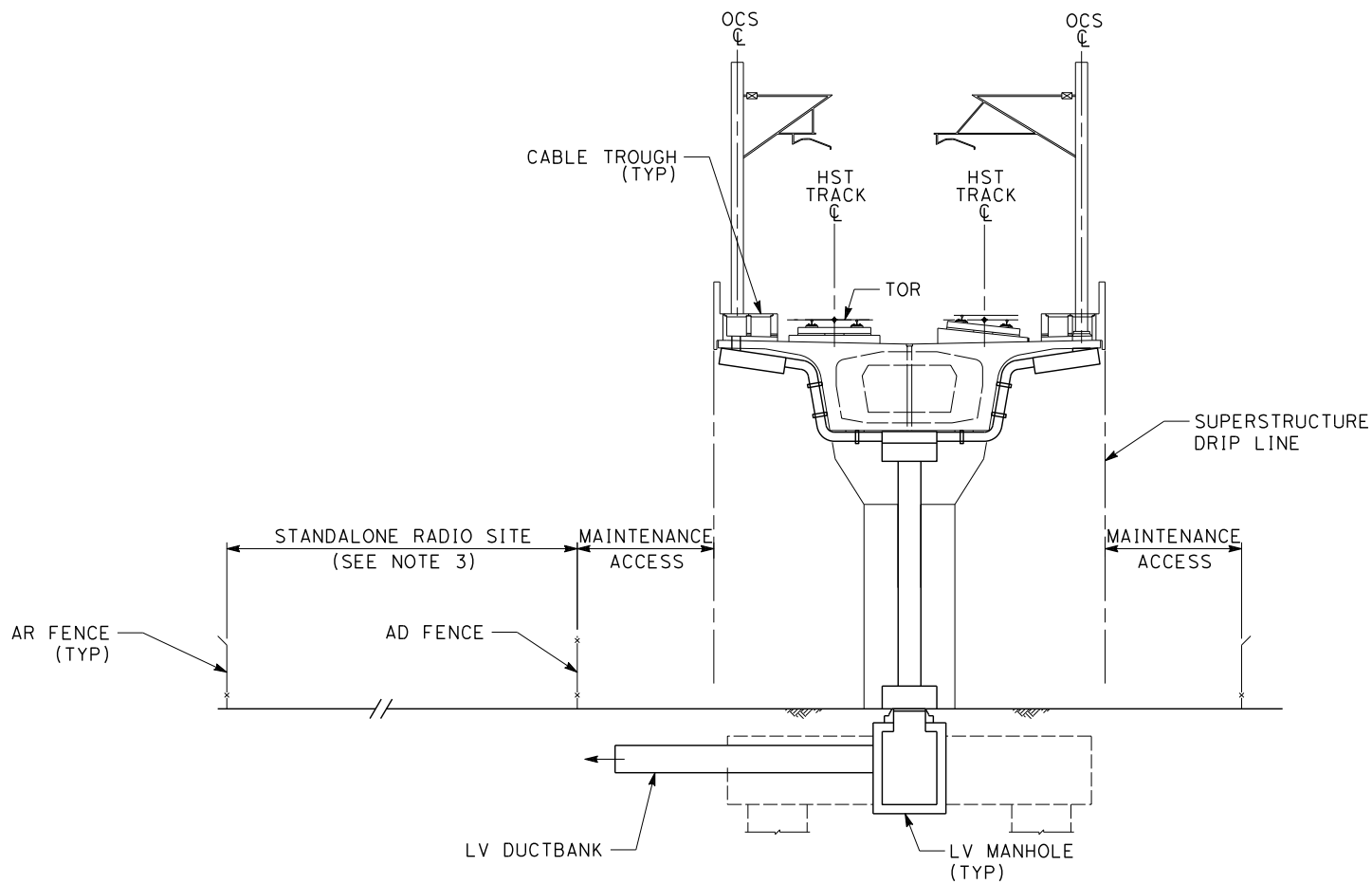
CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

**CALIFORNIA HIGH-SPEED TRAIN PROJECT
COMMUNICATIONS DIRECTIVE**

SYSTEMS SITE
STANDALONE RADIO SITE
AT-GRADE

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| CONTRACT NO. |
| DRAWING NO. DD-CO-G050 |
| SCALE NO SCALE |
| SHEET NO. |

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NOTES:

1. SYSTEM SITES AT AERIAL TRACKWAY ARE UNDESIRABLE. THESE CROSS-SECTIONS ARE ONLY APPLICABLE IF AT-GRADE SOLUTION IS DEMONSTRATED TO VIOLATE SITE SPACING REQUIREMENTS OR OTHER CRITICAL CRITERIA.
2. TYPICAL CROSS-SECTIONAL WIDTH SHOWN SHALL BE PROVIDED FOR A MINIMUM LENGTH EQUAL TO THE LONGITUDINAL DIMENSION OF THE SYSTEMS SITE.
3. FOR STANDALONE RADIO SITE REQUIREMENTS REFER TO COMMUNICATIONS SYSTEMS SITE REQUIREMENTS.
4. FOR ACCESS RESTRICTION FENCING AND BERM DETAILS, REFER TO CIVIL DIRECTIVE DRAWINGS.
5. TRACK SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN. FOR SITE DRAINAGE REQUIREMENTS REFER TO DRAINAGE DIRECTIVE DRAWINGS.
6. FOR ACCESS ROADS, ACCESS GATE AND ACCESS TO TRACKWAY REQUIREMENTS REFER TO SAFETY AND SECURITY DESIGN REQUIREMENTS FOR INFRASTRUCTURE ELEMENTS AND CIVIL DESIGN CRITERIA.

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DESIGNED BY
C. DALOIA
DRAWN BY
V. LAVERDE
CHECKED BY
B. MCNALLY
IN CHARGE
B. BANKS
DATE
8/29/2014

**PARSONS
BRINCKERHOFF**



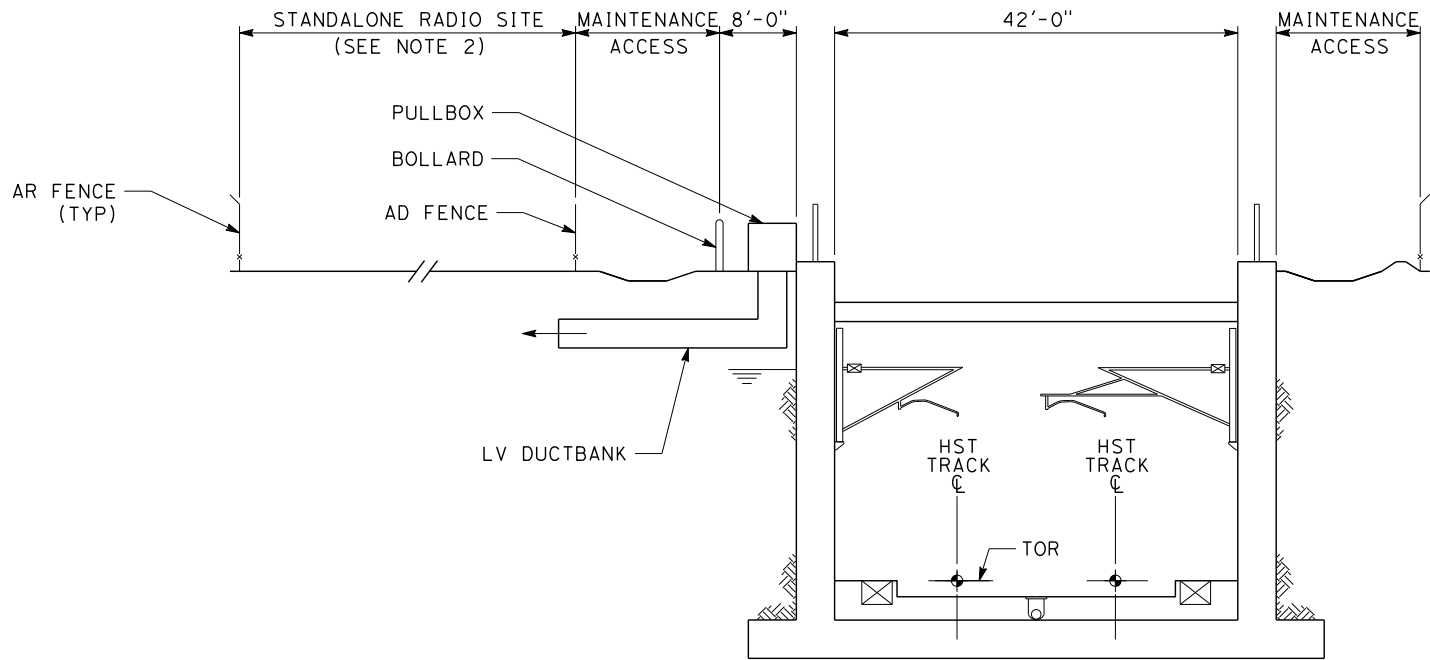
CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

**CALIFORNIA HIGH-SPEED TRAIN PROJECT
COMMUNICATIONS DIRECTIVE**

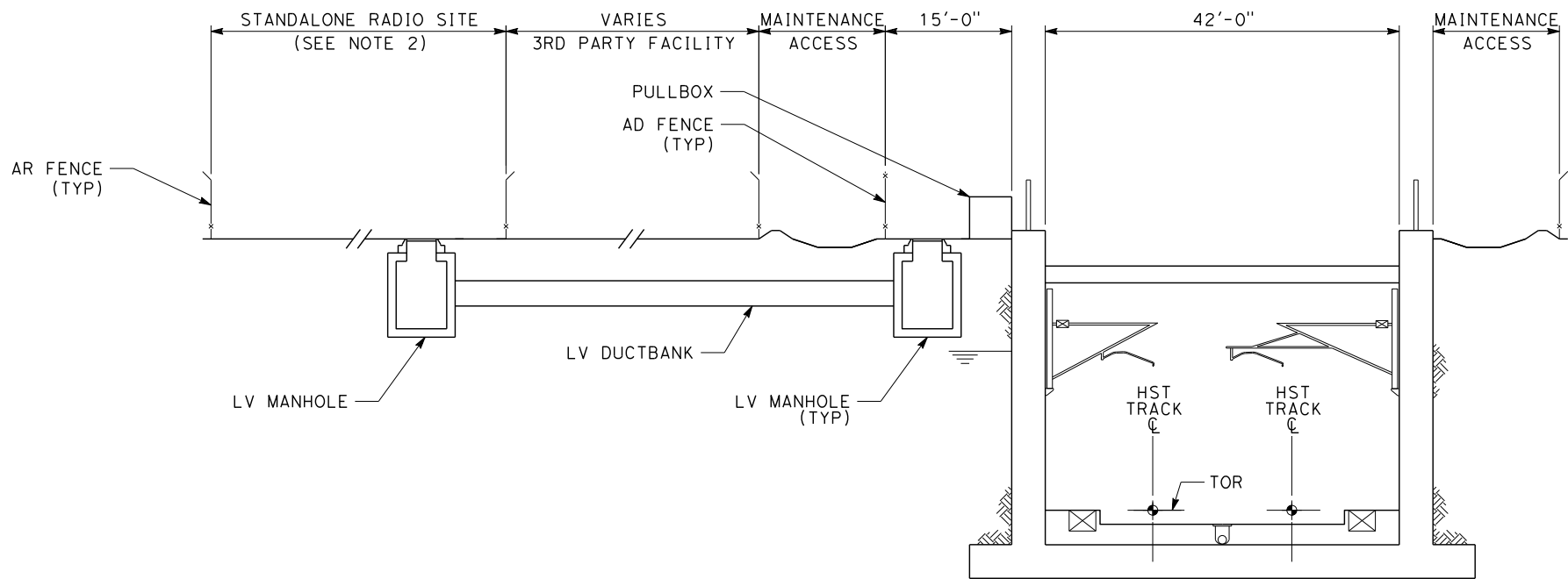
SYSTEMS SITE
STANDALONE RADIO SITE
AERIAL

CONTRACT NO.
DRAWING NO.
DD-CO-G051
SCALE
NO SCALE
SHEET NO.

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TYPICAL SECTION
STANDALONE RADIO SITE ADJACENT TO TRENCH HST TRACKWAY



TYPICAL SECTION
STANDALONE RADIO SITE AWAY FROM TRENCH HST TRACKWAY

- NOTES:**
1. SYSTEM SITES AT TRENCH TRACKWAY ARE UNDESIED. THESE CROSS-SECTIONS ARE ONLY APPLICABLE IF AT-GRADE SOLUTION IS DEMONSTRATED TO VIOLATE SITE SPACING REQUIREMENTS OR OTHER CRITICAL CRITERIA.
 2. FOR RETAINED-FILLED TRACKWAYS, REINFORCED CONCRETE RETAINING WALLS SHALL BE USED AT SYSTEMS SITES.
 3. TYPICAL CROSS-SECTIONAL WIDTH SHOWN SHALL BE PROVIDED FOR A MINIMUM LENGTH EQUAL TO THE LONGITUDINAL DIMENSION OF THE SYSTEMS SITE.
 4. FOR STANDALONE RADIO SITE REQUIREMENTS REFER TO COMMUNICATIONS SYSTEMS SITE REQUIREMENTS.
 5. FOR ACCESS RESTRICTION FENCING AND BERM DETAILS, REFER TO CIVIL DIRECTIVE DRAWINGS.
 6. TRACK SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN. FOR SITE DRAINAGE REQUIREMENTS REFER TO DRAINAGE DIRECTIVE DRAWINGS.
 7. FOR ACCESS ROADS, ACCESS GATE AND ACCESS TO TRACKWAY REQUIREMENTS REFER TO SAFETY AND SECURITY DESIGN REQUIREMENTS FOR INFRASTRUCTURE ELEMENTS AND CIVIL DESIGN CRITERIA.
 8. SYSTEM SITES AWAY FROM TRACKWAY, SEPARATED BY A THIRD-PARTY RIGHT-OF-WAY ARE UNDESIED. AWAY CROSS-SECTION IS ONLY APPLICABLE IF ADJACENT SOLUTION IS DEMONSTRATED TO VIOLATE SITE SPACING REQUIREMENTS OR OTHER CRITICAL CRITERIA.
 9. LOW VOLTAGE UNDERGROUND DUCTBANK AND MANHOLES TO BE PROVIDED UNDERNEATH 3RD PARTY RIGHT-OF-WAY.

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| DESIGNED BY C. DALOIA |
| DRAWN BY V. LAVERDE |
| CHECKED BY B. MCNALLY |
| IN CHARGE B. BANKS |
| DATE 8/29/2014 |

**PARSONS
BRINCKERHOFF**



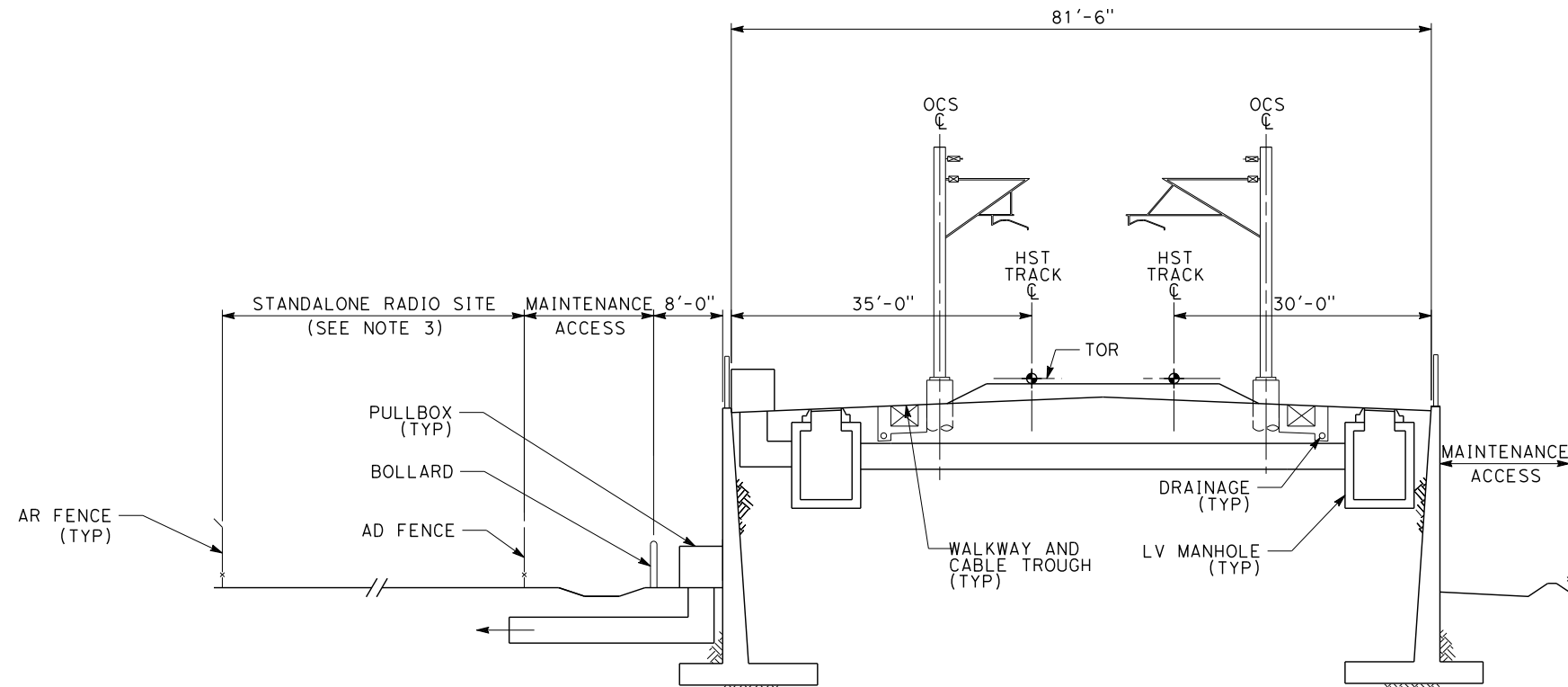
CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

**CALIFORNIA HIGH-SPEED TRAIN PROJECT
COMMUNICATIONS DIRECTIVE**

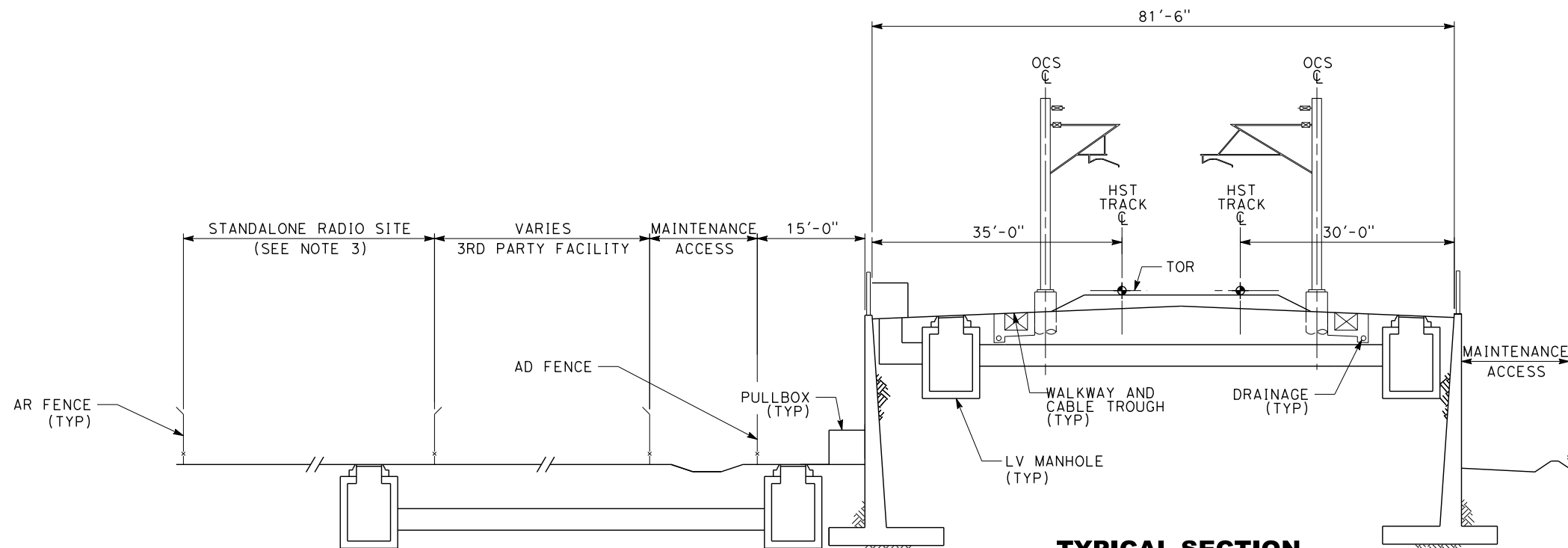
SYSTEMS SITE
STANDALONE RADIO SITE
TRENCH

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| CONTRACT NO. |
| DRAWING NO. DD-CO-G052 |
| SCALE NO SCALE |
| SHEET NO. |

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TYPICAL SECTION
STANDALONE RADIO SITE ADJACENT TO HST TRACKWAY
RETAINING WALL



TYPICAL SECTION
STANDALONE RADIO SITE AWAY FROM HST TRACKWAY
RETAINING WALL

NOTES:

1. SYSTEM SITES AT RETAINED FILL TRACKWAY ARE UNDESIRABLE. THESE CROSS-SECTIONS ARE ONLY APPLICABLE IF AT-GRADE SOLUTION IS DEMONSTRATED TO VIOLATE SITE SPACING REQUIREMENTS OR OTHER CRITICAL CRITERIA.
2. FOR RETAINED-FILLED TRACKWAYS, REINFORCED CONCRETE RETAINING WALLS SHALL BE USED AT SYSTEMS SITES.
3. TYPICAL CROSS-SECTIONAL WIDTH SHOWN SHALL BE PROVIDED FOR A MINIMUM LENGTH EQUAL TO THE LONGITUDINAL DIMENSION OF THE SYSTEMS SITE.
4. FOR STANDALONE RADIO SITE REQUIREMENTS REFER TO COMMUNICATIONS SYSTEMS SITE REQUIREMENTS.
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9. SYSTEM SITES AWAY FROM TRACKWAY, SEPARATED BY A THIRD-PARTY RIGHT-OF-WAY ARE UNDESIRABLE. AWAY CROSS-SECTION IS ONLY APPLICABLE IF ADJACENT SOLUTION IS DEMONSTRATED TO VIOLATE SITE SPACING REQUIREMENTS OR OTHER CRITICAL CRITERIA.
10. LOW VOLTAGE UNDERGROUND DUCTBANK AND MANHOLE TO BE PROVIDED UNDERNEATH 3RD PARTY RIGHT-OF-WAY TO CONNECT TO LOW VOLTAGE UNDERTRACK MANHOLES AND DUCTBANK.

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| DESIGNED BY C. DALOIA |
| DRAWN BY V. LAVERDE |
| CHECKED BY B. MCNALLY |
| IN CHARGE B. BANKS |
| DATE 8/29/2014 |

**PARSONS
BRINCKERHOFF**



CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

**CALIFORNIA HIGH-SPEED TRAIN PROJECT
COMMUNICATIONS DIRECTIVE**

SYSTEMS SITE
STANDALONE RADIO SITE
RETAINED-FILL

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| CONTRACT NO. |
| DRAWING NO. DD-CO-G053 |
| SCALE NO SCALE |
| SHEET NO. |